NAVAL POSTGRADUATE SCHOOL
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THESIS

AN ANALYSIS OF IMPLEMENTATION ISSUES FOR THE SEARCHABLE CONTENT OBJECT REFERENCE MODEL (SCORM) IN NAVY EDUCATION AND TRAINING

by

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September 2003

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13. ABSTRACT *(maximum 200 words)*

The thesis research examines the emergence of Sharable Content Object Reference Model (SCORM) architecture currently under development by the Advanced Distributed Learning (ADL) initiative established by the Department of Defense (DoD). SCORM is a collection of specifications adapted from multiple sources to provide a comprehensive suite of E-Learning capabilities that enable interoperability, accessibility, and reusability of Web-based learning content. To understand better the implementation issues of SCORM architecture, the authors analyze all versions of SCORM to understand the evolution of this emerging architecture. It contrasts the evolving requirements for shareable content objects with concerns of copyright issues. The authors address development and implementation issues surrounding the maturation of SCORM architecture and the ADL initiative. The authors recommend that DoD, international, and civilian business partners join in improving E-Learning by embracing technology, such as SCORM, that allows for shareable content objects to be used and reused within civilian and military education and training Learning Management Systems (LMS) across the World Wide Web.

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LIST OF ABBREVIATION AND ACRONYMS

ACCP   ADL Content Clearinghouse Portal

ADL   Advance Distributed Learning

AICC   Aviation Industry CBT Committee

API   Application Profile Interface

CBT   Computer Based Training

CMI   Computer Managed Instruction

CNET   Chief of Naval Education and Training

CSF   Course Structure Format

DEERS   Defense Enrollment Eligibility Reporting System

DLRC   Defense Learning Resource Center

DoD   Department of Defense

DoN   Department of the Navy

DUSD (P&R) Deputy Under Secretary of Defense for Personnel Readiness

E-Learning   Electronic Learning

ETSC   Education and Training Steering Committee

EXCEL   Excellence through Commitment to Education and Learning

GAO   General Accounting Office

IDA   Institute Defense Analysis

IEEE   Institute of Electrical and Electronics Engineers, Inc

IMS   Instructional Management Systems

LAN   Local Area Network

LMS	Learning Management System
LO	Learning Object
LOM	Learning Object Metadata
MIT	Massachusetts Institute of Technology
NEC	National Economic Council
NETC	Naval Education and Training Command
NIPRNET	Nonsecure Internet Protocol Router Network
NMCI	Navy and Marine Corps Intranet
NPDC	Naval Personnel Development Command
NPS	Naval Postgraduate School
NWC	Naval War College
OSD	Office of the Secretary of Defense
OSTP	Office of Science and Technology Policy
ROI	Return on Investment
SCA	Shareable Content Asset
SCO	Shareable Content Object
SCORM	Shareable Content Reference Model
SIPRNET	Secure Internet Protocol Router Network
T2 plan	Training Transformation Plan
TEACH	Technology Education and Copyright Harmonization
TFDLAT	Total Force Advanced Distributed Learning Action Team
TSC	Training Support Center
TTIP	Training Transformation Implementation Plan
VMS	Visual Management System

WWW	World Wide Web
XML	eXtensible Markup Language

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I. INTRODUCTION

A. PURPOSE

This thesis focuses on implementation issues of the Shareable Content Object Repository Model (SCORM) and its use in Navy education and training. It will reveal the genesis of SCORM technology and the potential benefits/pitfalls associated with its use in military education and training. It will also discuss the general, technical, and legal issues of using SCORM technology in the Department of Defense (DoD). The authors contend that the key to successful E-Learning lies in embracing SCORM technology and Advanced Distributed Learning Initiative (ADL) policies and strategies, which allows the use and reuse of shareable content objects within any SCORM-compliant Learning Management System (LMS).

B. MOTIVATION

Military organizations today are continuously searching for new E-Learning method(s) to move away from "right time, right place" to providing "anytime, anywhere" education and training that will improve human resource productivity, decrease costs, and improve results—all with limited resources. Additionally, the increased rate of deployments often involve rapid, unplanned movements to locations around the world which highlight the need for the military organizations to provide training on demand to sailors deployed worldwide. Accordingly, because of more demanding deployment criteria and other time-sensitive constraints, military organizations have recognized that yesterday's "right time, right place" learning framework, with its use of set times and places for training, may not meet future military requirements. It also recognizes that providing "anytime, anywhere" instruction is essential to maintaining military readiness in the information age, where future forces and their support activities need to be highly adaptive to meet threats effectively and rapidly. (GAO-03-393, February 2003) Conceptually, the difficult task of "anytime, anywhere" education and training can be accomplished with the use of SCORM architecture, which can provide more instruction with fewer resources. The ability to use and reuse shareable content is paramount in leveraging the highest possible return on the investment of education and training.

1. Improve Productivity, Satisfaction, and Retention

Continuing education and training are important contributors to human resource productivity and satisfaction. By providing cost-effective online training, military organizations can ensure that personnel remain abreast of important information and receive access to required training and professional development resources. As the rate of deployments increase, timely education and training becomes more important in personnel satisfaction. Maintaining high levels of personnel satisfaction will help decrease personnel turnover and thereby decrease costs associated with training new personnel.

2. Reduce Training Costs

Effective training plays an important role in a military organization's ability to achieve its goals. However, delivering training can be a costly undertaking or can be impossible due to geographical boundaries. By enabling the delivery of blended learning using SCORM architecture, military organizations can have maximum flexibility to provide field training and online learning for its personnel cost-effectively. The ability to use and reuse shareable content online can decrease many of the expenses related to keeping personnel informed and updated with the same baseline skills and knowledge without geographical boundaries.

C. RESEARCH QUESTIONS

The research questions addressed in this thesis are:

- What are the current architectural, cultural, economic, and technological challenges that confront the successful deployment of SCORM in Navy education and training?

- How will the ADL initiative benefit and affect the officers and sailors of the United States Navy?

D. SCOPE OF THESIS

This thesis encompasses an analysis of present day SCORM architecture, the ADL initiative, and their impact on Navy education and training; it will discuss implementation issues of possible deployment and reveal its benefits to Navy as well as

its present shortcomings, including technical and legal issues. Attention will be given to the ADL initiative and it's associated co-laboratories, which notably have the greatest experience with development of the SCORM architecture and which at present are the only organizations in the world that have facilities to implement and test SCORM applications. The ultimate goal of this thesis is to reveal the roadblocks to implementing the ADL initiative and to expose NPS staff and students to this newly emerging technology. The resulting recommendations provide a more effective strategy for implementing SCORM technology for "anytime, anywhere" instruction that is essential to maintaining military readiness against today and future changing threats.

E.   METHODOLOGY

The methodology used in this thesis research will consist of the following steps:

- Background research into distance learning, SCORM architectural requirements and ADL strategic and implementation planning. Conduct literature reviews of internet sources, video clips, magazine articles, books, expert interviews, and other information sources for material relevant to the study of SCORM and the catalysts prompting the use of this architectural technology.

- Carry out a review of present and evolving SCORM versions, implementation strategies, legislation, learning management system and policies in the commercial, academic, and government settings.

F.   ORGANIZATION OF STUDY

- Chapter II discusses the genesis of the digital knowledge environment and the catalysts for the need for shareable content objects in Advance Distributed Learning. Topics in this chapter include The Learning Transformation; Roadblocks to Transformation, which the authors will discuss in more detail in chapters IV and V; Executive Direction for E-Learning in the 21st Century; Overview of SCORM; History of SCORM; Present State of SCORM; The SCORM Collaboration; and most importantly, The Advanced Distance Learning Initiative.

- Chapter III provides the reader with the background on SCORM architecture. It discusses the evolving requirements and objectives of SCORM architecture as it matured into newer versions as well as the standards and specifications for the next generations of SCORM technology.

- Chapter IV discusses transformation issues affecting the ADL initiative implementation in Navy training. Presentation of these transformation issues required categorization into the following five subject areas: Organizational Structure Issues, Cultural Issues, Technological Issues, Policy Issues, and Financial Issues. Each subject area discusses transformation issues, which can directly affect Navy Training and the DoD's ability to execute programs that take full advantage of the ADL initiative.

- Chapter V discusses Navy education implementation issues to the ADL initiative. Topics include Navy Education Overview, Cultural Resistance, NETC E-Learning System Policy Issues, Digital Repositories, Intellectual Property Rights, Cost and Benefits, Policy Issues, Technological Challenges, Learner Roles and Issues, Educator Roles and Issues, The Changing Requirements of Navy Education, Role of Curriculum Officers and Support Personnel, and Changing the Quality of Online Courses.

- Chapter VI provides a conclusion, critical success factors, and recommendations based on best available information. The concept of using SCORM architecture is presented not as an instant cure for "anytime, anywhere" instruction, but as an evolving and layered approach to managing the military readiness through education and training in the new ever changing global environment in which we live, work, and play.

II. THE GENESIS OF THE DIGITAL KNOWLEDGE ENVIRONMENT

A. THE LEARNING TRANSFORMATION

Global terrorism and increasing regional conflicts have driven DoD to reinvent the way it responds to national security threats. DoD will no longer focus on specific enemies, like the Soviet Union during the cold war era. The new DoD approach will be a capabilities-based approach aimed at countering expected tactics from a broad range of potential enemies of the United States. To ensure we can meet this new requirement, the service members of DoD must be better equipped and better trained than it is today. Tomorrow's war fighting force must be able to respond decisively to any type of challenge, whenever or wherever it occurs. Pentagon official Paul W. Mayberry said, "We must train like we fight and fight like we train" (Harris, Nov 2002).

To accomplish this plan will require the development-training environment that is robust, integrated, networked, virtual, and constructive, enabling DoD to have and maintain knowledge superiority into the 21st century. The first part of the plan will review acquisition procedures to find where the training systems interface with processes such as logistics, personnel, education, and command and control. The second part of the plan calls for an integrated, live, and virtual training environment. Accomplishing this part of the plan through E-Learning initiatives provides just in time training along with systemic measurement of performance to improve operational effectiveness. It is this part of the plan that call for the development and assessment of Advanced Distributed Learning, the development of digital knowledge repositories and job performance technologies.

The Navy is taking the lead role when it comes to E-Learning. On 21 May 2000, the Chief of Naval Education and Training (CNET) initiated the Navy E-Learning website, which will track and manage the Navy's E-Learning courses. The Navy predicts this website will serve over 1.2 million sailors, marines, retirees, reservist, and civilians. The Navy's endorsement of E-Learning is setting the precedent for all the other services to follow (Ibid).

B. ROADBLOCKS TO TRANSFORMATION

So far, there has been a high rate of success in the Advanced Distributed Learning initiative; but as with any joint service initiative, there will be roadblocks and challenges. The change transformation in the way the services conduct their service-specific education and training requirements in an enormous task. Now, most instruction within DoD requires the presence of an instructor. How will the three million military personnel taking 30,000 military training courses react adopt and react to this new learning standard? Besides the three million users, there lies cultural, technological, policy, and financial challenges, which will affect the initiatives ability to achieve the benefits of enhanced E-Learning (GAO-03-393, Feb 2003).

1. The Cultural Challenge

One of the largest hurdles to the new E-Learning initiatives will be enlisting the commitment of senior military and civilian leadership within the services of DoD. DoD senior leadership is a byproduct of the traditional schoolhouse approach; so getting them to support a radical new way of learning will not be easy. The consensus of the ADL program officials contacted by GAO inspectors was that not all senior military and civilian leadership are committed to ADL; rather, they favored the traditional, schoolhouse learning system in place (Ibid). The resistance by senior leadership may be a function of unfamiliarity with the new and emerging E-Learning technologies like SCORM. It is human nature to want to protect ones domain. Similarly, GAO inspectors were also told that military services' schoolhouses would be unwilling to change due mostly to the fact that their funding and infrastructure are tied together and are dependent on the number of students trained on-site.

2. Technological Barriers

The availability of bandwidth is the largest technological barrier standing in the way of DoD's vision of "anytime, anywhere" delivery of training. Currently, bandwidth largely is insufficient to sustain interactive, multimedia, simulation E-Learning as intended by the ADL initiative. In the United States, there is both a surplus and a bottleneck of bandwidth available for use. Of all the fiber deployed throughout the U.S., only about 13 percent accounts for high-speed fiber going to the home. Currently, 50% of

U.S. homes have an internet connection and only 6.5 million of these have broadband connectivity. The current prediction is that the home broadband industry will be growing at a slower pace than originally predicted (Coleman, August 2001). Another technological glitch that could affect readiness is the development and access to military skills-related course content could prove to be more difficult than projected, leading to higher costs and slower content availability than forecasted.

3. Policy Challenges

The ADL initiative was slow in development because the Deputy Under Secretary of Defense (Personnel and Readiness) had not fully formulated policy and guidance to the services that address the use of advanced distance learning. The Launch of the Training Transformation Implementation Plan (T2) in July 2003 directly addresses the use of ADL for all services into one joint effort. As a result, the services now have service-specific guidance on the use of ADL, which will expedite the ADL initiative as originally envisioned.

4. Financial Hurdles

From 1999 through 2002, program requirements for ADL received $431 million, which is less than 1.3 percent of the entire education and training budget for those years. The ADL initiative projected a need for $2.2 billion through fiscal year 2007 but currently has only $1.6 billion budgeted for that period. This $600 million shortfall will have a direct impact on the ADL initiative. There are two reasons for this huge projected shortfall. First, the program requirements were difficult to determine due in part to the rapidly changing technology behind ADL. Second, some budget analysts projected training savings attributed to ADL implementation and had removed the projected savings from the budget before being realized (GAO-03-393 Report, February 2003).

C. EXECUTIVE DIRECTION FOR E-LEARNING IN THE 21ST CENTURY

The origins of the ADL Initiative are traced back to January 1998 with President Bill Clinton's executive branch memorandum, "*Enhancing Learning and Education through Technology*" (Appendix B). In this memorandum, President Clinton emphasized the need for the government to provide the best training for federal employees at the lowest cost. President Clinton directed the National Economic Council (NEC) to

investigate emerging technologies to improve the quality and cost effectiveness of federal training programs. He also directed the NEC to develop a national strategy for enhancing education through technology within sis months of the memorandum date (DoD Strategic Plan for ADL Initiative, March 2003).

Later in 1998, the Deputy Secretary of Defense promulgated his own memorandum for DoD components titled, *"Developing and Implementing DoD Advanced Distributed Learning Initiative"* (Appendix C). The Deputy Secretary of Defense noted that DoD's Advanced Distributed Learning Initiative would be the model for all other government entities to follow. He directed the Under Secretary of Defense for Personnel and Readiness to lead the way and provide DoD ADL strategic report for Congress no later than 23 February 1999 (Ibid).

On 12 January 1999 President Clinton sent out executive order 13111 (Appendix D) titled, *"Using Technology to Improve Training Opportunities for the Federal Government Employees."* In this order, the President directed the establishment of the President's Task Force on Federal Training Technology to provide leadership and guidance in the effective use technology in the education. The task force developed policy to make effective use of technology to improve training opportunities for the federal government employees. In just eighteen months, the task force developed the policy (Ibid).

President Clinton's memorandum and Executive Order were later reinforced with the introduction of Strom Thurmond's National Defense Authorization Act, Section 378 of Public Law 105-261 for Fiscal Year 1999 (Appendix E). Section 378 "requires the Secretary of Defense to develop a strategic plan for guiding and expanding distance learning initiatives within the Department of Defense no later than 01 March 1999" (Ibid), including a provision for the expansion of such initiatives over five consecutive years beginning in FY 2000. This Act states that the Secretary may utilize and take into account the ongoing collaborative effort known as the ADL initiative. The Act also states that the strategic plan must center its strategy on the education and training goals and objectives of DoD (Ibid).

The culmination of these acts, laws, and orders set off a chain of events that lead directly to the creation of the ADL Initiative, further leading the way toward directing technology in the area of education and training for all employees on the federal payroll. The ADL Initiative sets forth an innovative paradigm intended to execute the President's and the Secretary's vision for training employees of the federal government with the highest quality education and training tailored and delivered to individual needs.

D. OVERVIEW OF SCORM

Classroom, videotape, or a computer-based training format is the basis for current distribution of, most military training courseware. Military courseware is not easily adaptable to the free style of the World Wide Web. The problem is that a Navy courseware developer using another vendors authoring software cannot access an Army courseware developer using one commercial vendor's authoring software. This impedes the ability of a student to gain access to an assortment of knowledge available from instructors, subject matter experts, and other educational institutions.

The solution will be to develop software standards so that a course developed by an Army Learning Management System (LMS) that can work in with an LMS in the Navy and vice versa. The first step will be to get the current developers to agree on the goal of an open architecture standard for sharing courseware content across the web. DoD took the first step to this goal by creating the Advanced Distributed Learning (ADL) Co-Laboratories. The ADL laboratories came with the name Sharable Content Object Reference Model (SCORM) for the open architecture standard.

SCORM is a compilation of specifications adapted from many sources that will ultimately enable the interoperability, accessibility, and most importantly the reusability of courseware via web-based LMSs. The primary goal of the ADL laboratories is to develop the SCORM. The secondary goal is to bring together the different software companies, groups, interests, emerging-technologies, and commercial and/or public implementations of SCORM.

To meet DoD's complex and advanced requirements for web-based learning content, SCORM is built upon the framework of the AICC, IMS, IEEE, ARIANDE, and

others to create one integrated "reference model" of interrelated technical specifications and guidelines. ADL must bring LMS vendors, content authoring tool vendors, instructional designers, content developers, training providers, and others to work in a joint environment with the common goal of implementing SCORM. These vendors and groups have made great strides in the development of aspects of web-based learning technology. The problem lies with the fact that these same development aspects do not connect in a common manner. It is here where ADL hopes to fuse industry, academic, and government participants together with the common goal of bringing SCORM technology to the forefront.

E.   HISTORY OF SCORM

Every year, DoD spends millions of dollars in the development of E-Learning content. With all these, spent millions of dollars on E-Learning content, DoD realized is was difficult to reuse this content from one department to the other. Different branches of the military had developed E-Learning content on similar course topics. Each department would develop its own courses with its own software not designed, which for reuse by another branch using a different software system. DoD realized that adopting standards for e-content would allow for reusing learning content developed for one course, then learning content will become a commodity for all DoD training and education departments.

Military training during the 80s and early 90s mostly consisted of Computer Based Training (CBT) systems. During this period, proprietary software created most, CBTs. The proprietary software products were used to create interactive courses which became multimedia-rich. Stand alone Personal Computers (PCs) were the instrument of delivery for CBT. It was in the early 90s that vendors began to link Local Area Networks (LANs) and PCs together. It was this linking that drove the development of computer-managed instruction systems (ADL Background, March 2003).

Next was the transition into the World Wide Web (WWW), which changed the CBT commerce. CBT vendors tried to adapt their system tools to the WWW, which yielded varied results initially. The vendors proprietary data formats were not compatible

with the standards of the WWW. The launching of the ADL initiative took place because DoD understood there was a major problem, which required correction.

DoD and the Institute for Defense Analysis (IDA) launched a new initiative, intending to step up the adoption of advanced distributed learning technologies. In the Fall of 1997, DoD in conjunction with the White House Office of Science and Technology and the Department of Labor, started the ADL initiative. Within the year, the ADL team had created a game plan, the core of which mandated the creation of interoperability standards. On 12 January 1999, Executive Order 13111 (Appendix D) was signed, tasking DoD to take the lead in working with other federal agencies and the private sector to develop common specifications and standards for technology-based learning.

F.   PRESENT STATE OF SCORM

ADL joined with industry, higher education, and government experts to determine the current state of the art in E-Learning. ADL also joined with the leading technology standards group experts, including AICC, IEEE, ARIADNE, ALIC, and others. The creation of the SCORM got these standard experts together and gave them a building block to utilize. ADL released a draft version of the original SCORM in 1999; Version 1.0 in 2000; Version 1.1 and 1.2 in 2001; and Version 1.3 in 2003. Figure 1 below shows the timeline for SCORM releases to date.
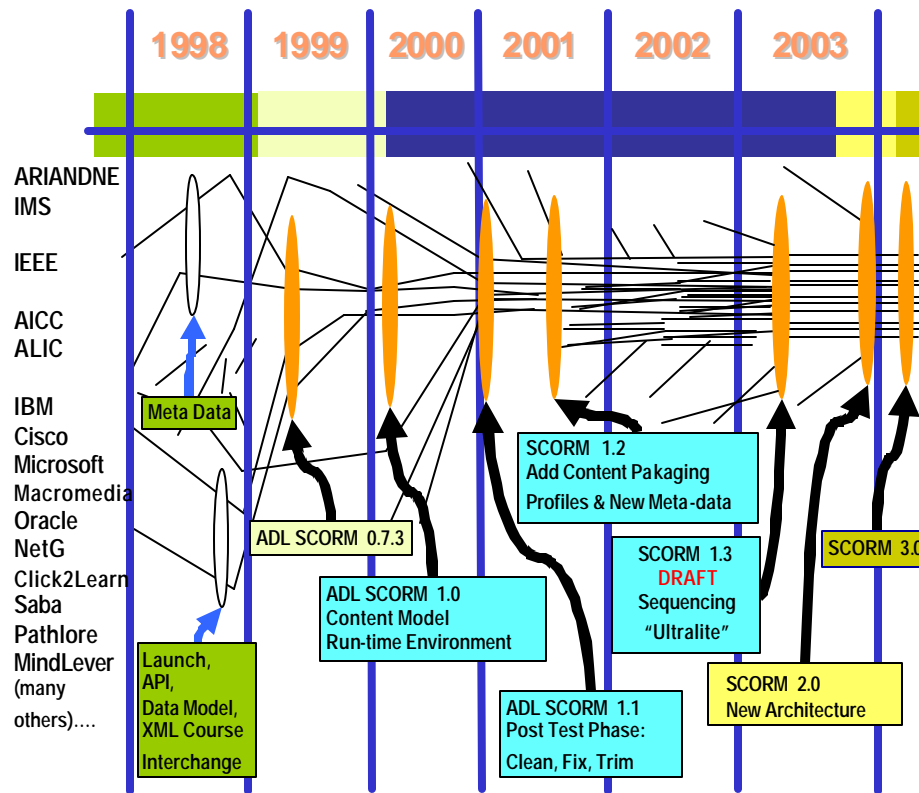
Figure 1.　　　SCORM Timeline Release Dates (From: Dodds, February 2002)

G.　　THE SCORM COLLABORATION

The successful implementation of the ADL Initiative, calls went forth for collaboration effort between academia, federal agencies, private corporations, and the Department of Defense. DoD is leading the way in establishing a cost-effective distributed learning environment that is consistent and viable across all the military services. Academia, private corporations, and other federal agencies have similar interests. The collaboration of partnerships between the federal government, private sector, and the broader education and training communities will be the means to create voluntary guidelines meeting common needs of the collaboration (Creating the Digital Environment, March 2003). Tables 1-4 list of the various associations within the SCORM collaboration (ADL Partners, March 2003).

Academia	
University of Wisconsin System (co-host)	Northern State University
Wisconsin Technical College System (co-host)	Old Dominion University
Air Force Institute for Advanced Distributed Learning	The Pennsylvania State University
Atlantic Cape Community College	Purdue University
Bloomsburg University	Rochester Institute of Technology
California Virtual Campus	Rutgers University
Cameron University	Saint Francis University
Capella University	Saint Joseph's University
Carnegie Mellon University	Southern Regional Education Board
Central Texas College	The Texas A&M University System
Defense Acquisition University	University of Alaska
Fairleigh Dickinson University	University of California - Berkeley Extension
Florida Community College Distance Learning Consortium	University of Califomia - Irvine
Foothill College	University of Hawaii (at Manoa)
Indiana University, Bloomington	University of Illinois at Urbana-Champaign
Macquarie University - Australia	University of Maryland University College
Medical Center Campus, Miami-Dade Community College	University of Mounted Warfare
Minnesota State Colleges & Universities	University of Nebraska - Lincoln
Mississippi State University	University of New Orleans
Naval Postgraduate School	University of Washington

Table 1.   The Academic Associations

13

Government	
Center for Disease Control (CDC)	Department of Agriculture, Graduate School
Department of Education (DoEd)	Department of Interior, Bureau of Land Management
Department of Justice (DoJ)	Department of Labor (DoL)
Department of Treasury, Office of the Comptroller Currency	Internal Revenue Service (IRS)
Mine Safety Health Agency (MSHA)	National Academy of Public Administration (NAPA)
National Aeronautic Space Agency (NASA)	National Guard Bureau (NGB)
United States Postal Service (USPS)	Veterans Administration (VA)

Table 2.   The Government Associations

Military	
Air Force Advanced Modeling and Simulation (AFAMS)	Brooks Air Force Base
Bureau of Land Management / National Interagency Fire Center	Defense Acquisition University (DAU)
Fort Gordon	Fort Huachuca
Joint Services (J7)	Joint Special Operations University
National Guard Bureau (NGB)	Naval Aviation (NAVAIR) Orlando
Randolph Air Force Base	Southern Command (SOCOM)
U.S. Army Forces Command (FORSCOM)	U.S. Army Medical Department (AMEDD)
U.S. Army PEO C3T / Fort Monmouth	U.S. Army PEO STRI / Simulation, Training & Instrumentation
U.S. Army Research Institute (ARI)	U.S. Army Research, Development and Engineering Command (RDECOM)
U.S. Marine Corp	

Table 3.   The Military Associations

Industry	
Acer Enrich Technology Corporation	ACORDE Media, S.A.
Advanced Learning Infrastructure Consortium (ALIC)	(ADRIANE)
AltEd Inc.	Anark Corporation
Anteon Corporation	Aviation Industry CBT Committee (AICC)
Avilar Technologies, Inc.	Boxer Technologies AS
Brainvisa Technologies Ltd.	Centra
Click2Learn, Inc.	ClineTech Co., Ltd.
Concurrent Technologies Corporation (CTC)	Creative Education (Credu)
Desire2Learn Inc.	Digital Concepts, Inc.
DigitalThink	Discovery Machine, Inc.
e2train Limited	GIUNTI Interactive Labs
Global Knowledge	IIC Technologies
IMS Global Learning Consortium, Inc.	Institute for Information Industry (III)
Institute of Electrical and Electronics Engineers (IEEE)	Knowledge Management Solutions, Inc.
Laragh Courseware	Learning Objects Network, Inc.
Nomura Research Institute (NRI)	Northrop Grumman
Onlin E-Learning.com	Pathlore, Inc.
PlaNet Software	ReadyGo, Inc.
Recombo, Inc.	Saba Software, Inc.
Shubiki Corporation	The Learning Community
THINQ Learning Solutions, Inc.	UNITECH
Acer Enrich Technology Corporation	ACORDE Media, S.A.
Advanced Learning Infrastructure Consortium (ALIC)	(ADRIANE)
AltEd Inc.	Anark Corporation

Table 4.   The Industry Associations

H. THE ADVANCED DISTANCE LEARNING INITIATIVE

The Department of Defense and the White House Office of Science and Technology Policy (OSTP) launched the ADL initiative to accelerate development of learning software and to encourage a market for E-Learning software products. The objective of the ADL initiative is to meet the education and training needs of the military and the nation's workforce in the 21st century. The goal of the ADL initiative is also to understanding how to exploit fully the next generation technology infrastructure to meet the Navy's future concepts of anytime, anywhere E-Learning.

1. The Fundamentals Elements of the ADL Vision

The fundamentals of the ADL initiative are the development of digital E-Learning repositories and reusable, sharable learning objects. The fundamental building block is the establishment of database repositories, where the sharable learning objects are collected and cataloged for broad distribution and use. Accessibility of these objects via the World Wide Web is key fundamental element, which will make the ADL vision a reality in the future.

The development of reusable, sharable learning objects is another fundamental key to ADL's long-term vision. Once repositories for sharable learning objects come into existence and are commonly available to educators, the vision will become the reality. The development of these repositories will spark an instructional object economy where content creators will have creative freedom to develop high quality learning objects with a completely new class of products for the E-Learning environment (DoD Implementation Plan for ADL, May 2000).

2. The ADL Co-Laboratory Role

The foundation of the ADL Co-Lab is the basis of Joint service and interagency collaboration and demonstration. In 1999, the Department of Defense built and established the first Co-Laboratory located in Alexandria, Virginia. The Co-Lab currently houses or hosts several DoD service agencies, hosts agency sponsors, and project managers in an effort to stimulate and monitor progress across all forums in the E-Learning efforts. In an effort to reach out to specific communities, DoD established two

other Co-Lab nodes in Madison, Wisconsin, and Orlando, Florida. To promote collaboration with military services DoD established the Orlando node. To promote collaboration among academic institutions the Madison node functions as an independent academic node in partnership with the University of Wisconsin and the Wisconsin Technical College System. Finally, a virtual Co-Lab was established so all three Co-Labs could share information, expertise, and common tools (Ibid). Figure 2 illustrates the Co-Lab process and ADL collaboration interaction.

ADL Co-Lab Process

Federal Agencies Academia

Military Services

DoD Components

IEEE TWG

Co-Lab Industry

Joint Community National Guard

IMS VENDORS

AICC

- Coordinate and Perform R&D
- Serve as a Test Bed
- Provide Learning Technology Demos
- Provide a Database for Federal Training
- Provide a Resource Center and Help Desk Function
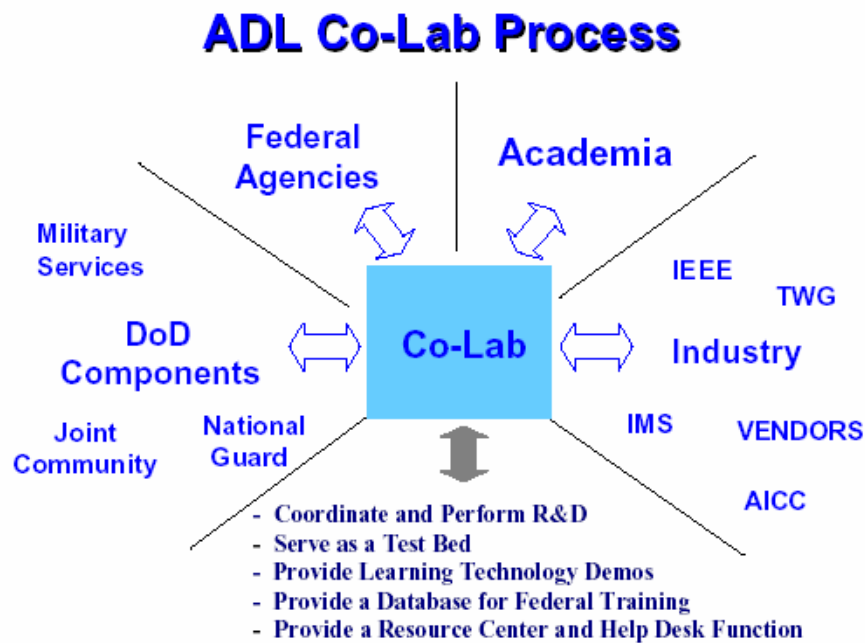
Figure 2.   ADL Co-Lab Concept of Operations (From: DOD Implementation Plan, March 2003)

There have been six plugfest held since the initial establishment of the ADL Co-Labs. Twice a year the ADL Co-Labs bring together early adopters of the SCORM. The plugfests provide ADL partners with the opportunity to synchronize physically their efforts. These plugfests bring together E-Learning software developers and content providers from various sectors of the federal government, industry, and academia to a single site to participate in plugfest. The plugfest is a place where these entities can bring their prototypes and projects for test and evaluation among their peers (Plugfest Overview, March 2003).

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3. The ADL Initiative Management Structure

The Deputy Under Secretary of Defense for Personnel Readiness (DUSD (P&R)) has overall policy authority and responsibility for the ADL initiative. The DUSD (P&R) is working in conjunction with the Office of the Secretary of Defense, Services, Joint Staff, and DoD Components establish a management medium for coordination of advanced distributed learning programs within the Department of Defense. Figure 3 illustrates the organizational structure responsible for coordinating and overseeing the technical and policy considerations associated with the ADL initiative. This organizational structure is the guide for the development and implementation of advanced distributed learning policies and programs (DoD Implementation Plan for ADL, May 2000).
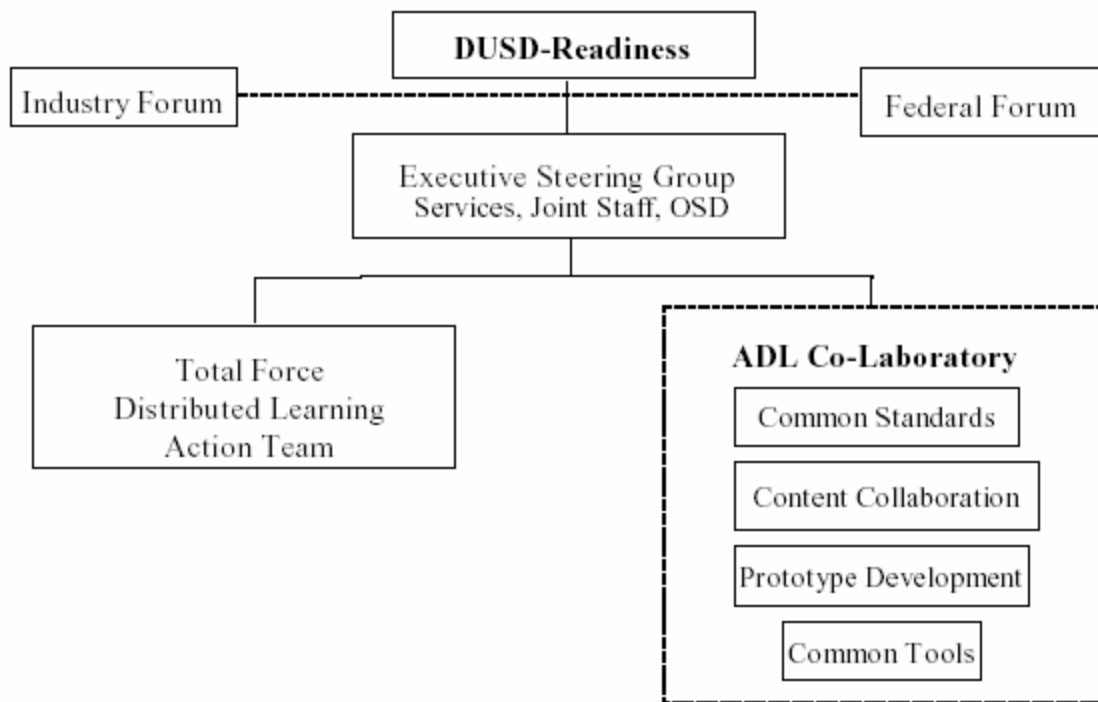
Figure 3.   ADL Initiative Management Structure (From: ADL Initiative Version 1.2)

4. Education and Training Steering Committee (ETSC) Role and Responsibilities

The role of this committee is to advise and assist the DUSD (P&R) on all phases of the ADL initiative, ensuring that DoD personnel have access to cost-effective, high-

quality education and training, tailored to their needs, anywhere, anytime. The committee meets quarterly to join the efforts of the organizations and headquarters supporting service specific training and education SCORM issues (Ibid).

5. Total Force Advanced Distributed Learning Action Team (TFDLAT) Role and Responsibilities

The TFDLAT is the working body group with representatives from each service supporting the ETSC. The chair of the TFDLAT is representative appointed by the DUSD (P&R). The TFDLAT advises and assists the DUSD(R) on all aspects of advanced distributed learning. The TFDLAT accomplished this by providing oversight for advanced distributed learning courseware development and implementation and by providing a forum for discussion and resolution of practical issues in advanced distributed learning. This committee also drafts, reviews, researches and evaluates polices for the ETSC (TFADLAT, March 2003).

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III.   SCORM ARCHITECTURE

A.   FUNCTIONAL REQUIREMENTS SCORM FOR SCORM

At its most basic form, SCORM defines the requirements for web-based E-Learning with a content aggregation model and the run-time environment. SCORM is a model that references a set of interconnected technical specifications and guidelines, which ultimately will serve as the backbone for web-based E-Learning content. For the most part, SCORM runtime environment specifications come straight from the AICC, which is one of the early developers in the world of E-Learning. The basis for the SCORM content aggregation is the IEEE specifications developed by IMS and ARIANDE (Shakelford, August 2002). The basic functional requirements include:

- **Accessibility:** The ability to access lesson components from a distance and deliver them to other locations.
- **Interoperability:** The ability to use lesson components developed in one location with one set of tools or platform and operates them in another location with a different set of tools or platform.
- **Durability:** Course lesson components that do not require redesign or re-coding to operate when base technology changes.
- **Reusability:** The design of lesson components so that it can be incorporated into multiple applications instruction.

Version 1.0, originally named Sharable Courseware Object Reference Model, changed its name to Searchable Content Object Reference Model. Initially released in January 2000, version 1.0 introduced the first specifications and guidelines utilized. SCORM specification versions 1.1, 1.2, and working draft 1.3 have since been released. Later in this chapter there will be more detailed discussion on the differences between the versions The architecture discussed in this chapter mainly based on the draft version 1.3 released on 27 November 2002.

B.   LEARNING MANAGEMENT SYSTEM CONCEPT

Before examining the actual SCORM architecture, the authors think it important to review what Learning Management Systems (LMS) are and what they do. LMS refers to a collection of functionalities integrated into an educational software system that will

deliver, track, report on, and administer learning content, student progress, and student interactions. Some popular LMS software packages in use at educational systems throughout the world include Blackboard, WebCT, Saba, IntraLearn, Knowledge Planet, and ThinQ. Figure 4 is a generalized LMS model that highlights possible components and services a typical LMS may have.
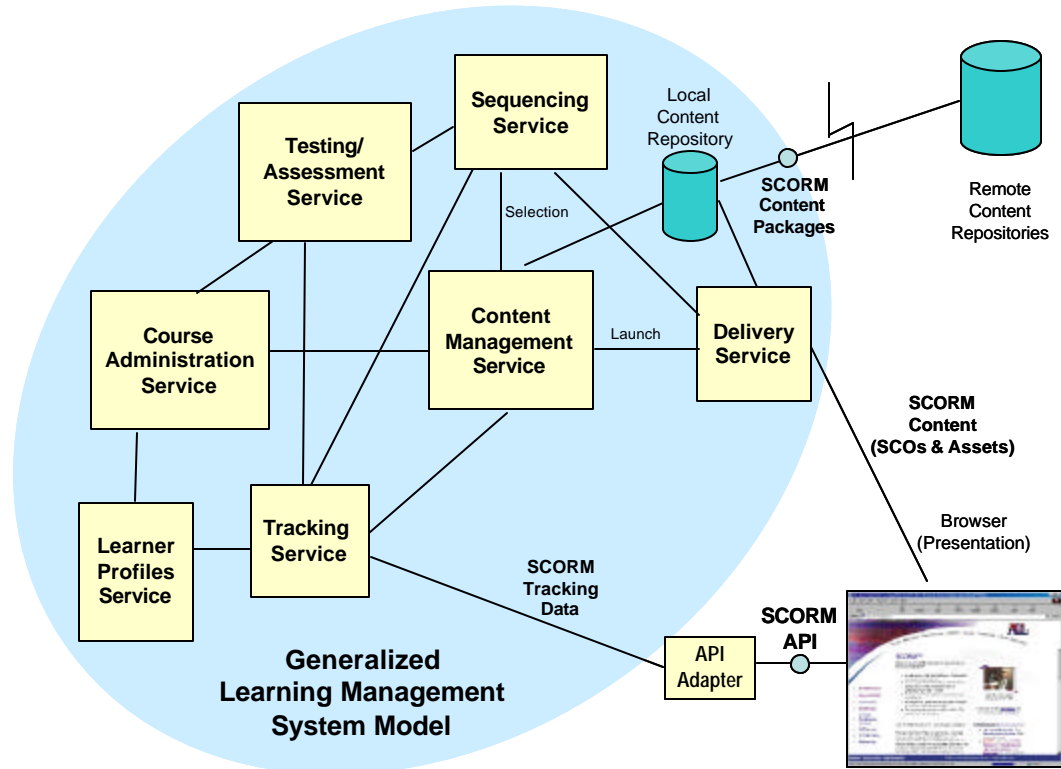
Figure 4.   Generalized Model of LMS (From: Version 1.2, October 2001)

The origins of the LMS go back to Computer Managed Instruction (CMI). An LMS is essentially a suite of functionalities designed to deliver, track, report on, and administer learning content and student interactions. SCORM does not seek to define LMS authoring tool functionality; however, for SCORM to achieve its goals, LMS and content authoring tools will need to utilize the technical details of the SCORM model (Version 1.2, October 2001). The intention of the SCORM model is to provide three main capabilities for an LMS:

- Move courseware content from one LMS to another
- Permit reuse of executable content elements within multiple LMS's
- Provide information about course, content, and raw media elements to facilitate their reuse

C.   E-LEARNING REPOSITORIES

Another important element in the ADL initiative is the creation of E-Learning digital repositories. The Instructional Management Systems (IMS) Global Learning Consortium released the digital repositories version 1.0 final specifications on 30 January 2003, providing recommendations for the interoperation of the most general repository functions (IMS Global Learning Consortium, April 2003). The future of ADL centers on the learning object economy, where people would create, trade, and use learning objects for online teaching material. It is in this new learning object economy where the digital repository is the central part of the ADL process. Teachers, professors, and private courseware educational firms will submit learning objects for storage, expose them for searching, and will allow gathering by others in data-like repositories located throughout the world. Once in these repositories, allowing one to search, download, and reuse E-Learning objects free or for a small monetary fee subject to the owner of the repository. Figure 5 represents a typical digital repository deployment.
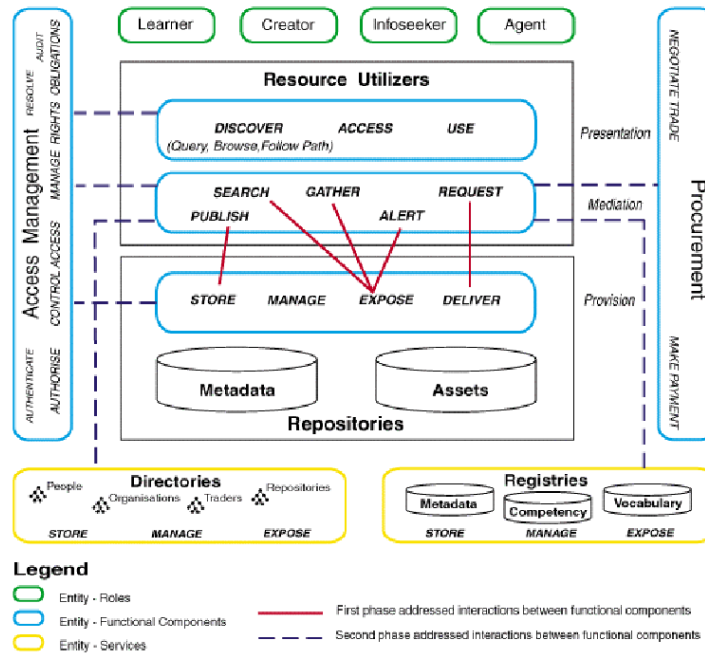
Figure 5.   Digital Repository Model (From: IMS Global Learning Consortium, April 2003)

DoD has put together a cross-service digital repository working group, which will be responsible for DoD repository issues and implementations. With mandate, the working group developed a common DoD approach for interfacing and interoperating with E-Learning repositories owned by the services. This group will answer the questions like, who will be responsible for learning resource reuse strategy, who will decide on specifications adopted, and who will pay for these service repositories within DoD mandate (Christensen, April 2003).

D.   CONTENT AGGREGATION MODEL

The SCORM content aggregation model defines the technical methods for providing a common means for creating learning content from searchable, reusable, sharable, and interoperable sources. The content aggregation model also describes how learning content identifies, describes, and aggregates, into a course and moved from one LMS to another or between E-Learning digital repositories (Version 1.2, October 2001).

1. Assets

Assets refer to the fundamental building blocks of learning content. Assets come in many electronic forms and files, which include text, data, sound, pictures, video, web pages, or any other pieces of data that delivered to a web client. In the SCORM model, eXtensible (XML) Markup Language tags metadata to assets. The use of XML allows for searching capability on the World Wide Wed inside the digital repositories described earlier in this chapter. Once tagged the asset, develops into a content package. This tagged asset then becomes a reusable content package and serves as the basis of the SCORM model (ADL SCORM Application Profile, Version 1.3, November 2002). Figure 6 allows the reader visualize asset forms and the content package graphically.
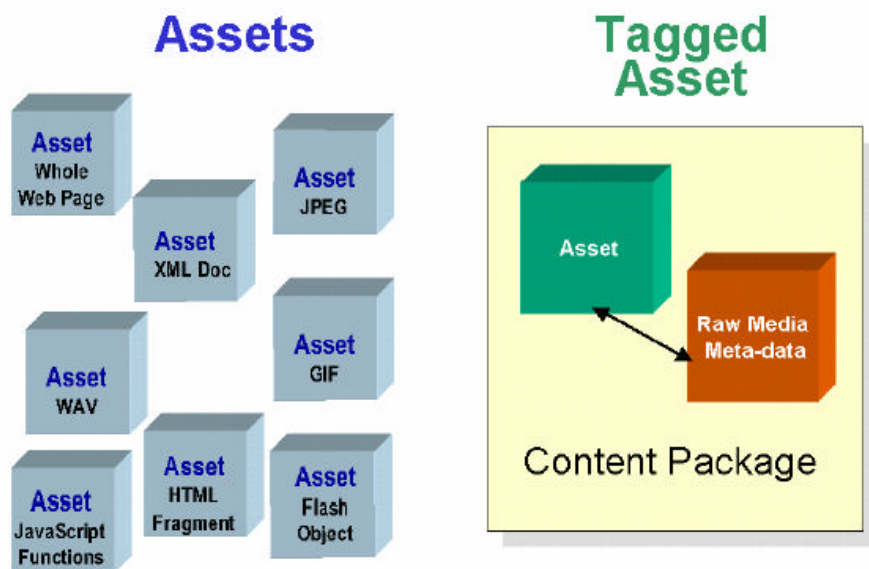
Figure 6. Assets and Content Package (From: Version 1.1, January 2001)

2. Sharable Content Asset (SCA)

The second building block of the SCORM model is a collection of one or more assets packaged together. These tagged content packages with SCA metadata allow searching by potential users through the World Wide Web inside digital repositories. An SCA does not have the ability to communicate with an LMS with this SCORM version. (Ibid). Figure 7 is one example of a sharable content asset.
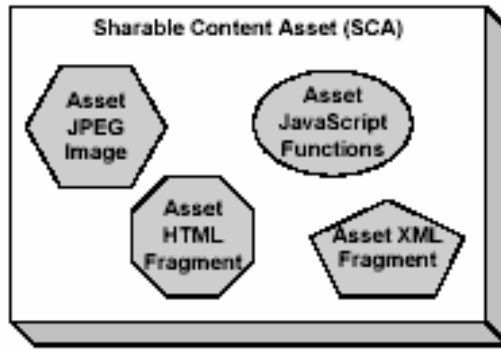
Figure 7.   Example of a Sharable Content Asset (From: Version 1.3, November 2002)

3.   Sharable Content Object (SCO)

The third building block of the SCORM model is the Sharable Content Object, which essentially is an SCA that includes a single launchable resource and begins to utilize the SCORM runtime environment later detailed in this chapter. The runtime environment allows SCO's to communicate with learning management systems, which the previous SCA's could not. SCO's are essentially one or more assets attached together that allows for interactivity and tracking of the learner that achieves a learning objective.

As with the assets and SCA's, metadata describes and tags SCO's that allows metadata for searchability on the World Wide Web inside digital repositories. The intention is for SCO's to be free of learning context. This way, different authors can achieve different objectives in learning by reusing the SCO's. Aggregated SCO's can form higher-level units of instructions. This allows content developers of instruction and training courses to search, find, and aggregate SCO's into their own learning objectives. In accordance with the SCORM model, the SCO is required to participate in the runtime environment, allowing the LMS to launch and track them. The runtime environment will also allow the LMS to track when the start and end of a SCO (Ibid).

4.   Content Aggregation

A good analogy of content aggregation would be to compare it to a map. The map aggregates the learning resources into units of instruction similar to a chapter or a module. As with the previous building blocks, this building block is also with metadata to

allow for searchability and reusability. It is content aggregation, which defines the content structure that subsequently defines the navigation and sequencing rules the LMS uses (Ibid). Figure 8 is a graphical representation of how content aggregation relates to content structure and SCO's.
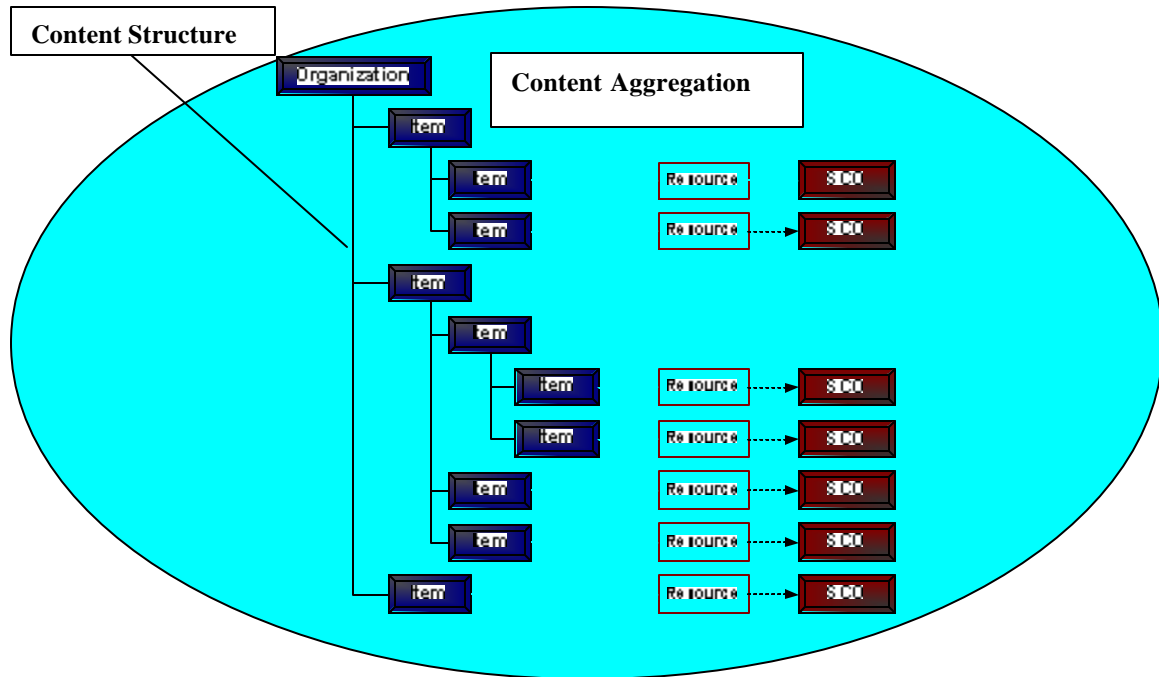
Figure 8.   Content Aggregation (After: Version 1.3, November 2002)

E.   SCORM METADATA AND ITS COMPONENTS

The function of metadata is to present a universal nomenclature, allowing learning resources description in a common way for searchability and reuse. The SCORM model uses metadata to describe learning resources for searchability and reuse. ADL has been working closely with a number of standards groups to develop and define metadata for learning resources. The SCORM model references the 1484.12.1-2002 IEEE LTSC Learning Object Metadata (LOM) standard. In the future, the SCORM model will also reference XML binding specifications once they become fully developed. As discussed earlier in this chapter, the SCORM model will apply metadata definitions to the asset, SCO, SCA, and content aggregation components of the SCORM model (Ibid).

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1.   Information Model

The information model describes the data elements allowed to build SCORM-conformant metadata records. The information model utilizes the LOM standard to describe the initial set of data elements. Along with the requirements defined in the information model, the SCORM defines application profiles for several types of metadata instances. The information model is broken up into nine categories. The LOM standard is the basis of these categories definition. Table 5 lists and defines the nine categories of metadata elements. In addition to the elements and descriptions in Table 5, the elements are defined with a hierarchical number system, the allowed number of instances for the element, and data type (Ibid).

Metadata Elements	Description
General	*General information that describes the resource as a whole*
Lifecycle	*Groups the features related to the history and current state of this resource and those who have affected this resource during its evolution*
Meta-metadata	*Information about the metadata record itself*
Technical	*Technical requirements and characteristics of the resource*
Educational	*Educational and pedagogic characteristics of the resource*
Rights	*Intellectual property rights and conditions of use for the resource*
Relation	*Define the relationship between this resource and other targeted resources*
Annotation	*Provides comments on the educational use of the resource and information on when and by whom the comments were created*
Classification	*Describes where this resource falls within a particular classification system*

Table 5.   Information Model Metadata Elements (After: Version 1.3, November 2002)

2. XML Data Binding

At the time of this thesis, XML data binding was under development. XML data binding is an integral part of the SCORM model that defines how to encode or bind the dictionary elements in XML. Currently, XML is the choice language for internet communication and encoding SCORM elements. Over time, implementation of other languages may come forward into the SCORM model; but for the near future, XML will be the language of choice for SCORM model XML binding.

3. Metadata Application Profiles

Application profiles describe the integration of the standards within the ADL setting. The application profiles further define the types of metadata and the application the content aggregation model. Application profiles will require additional mandatory and optional constraints to the content aggregation, SCO, and asset pieces. Table 6 is an application profile example of the metadata general element. These application profiles define the mandatory, required, and optional constraints for all nine elements and sub elements.

Name	Content Aggregation	SCO	Asset
1.0 general	M	M	M
1.1 identifier	R	R	R
1.2 title	M	M	M
1.3 catalogentry	M	M	O
1.3.1 catalog	M	M	O
1.3.2 entry	M	M	O
1.4 language	O	O	O
1.5 description	M	M	M
1.6 keyword	M	M	O
1.7 coverage	O	O	O
1.8 structure	O	O	O
1.9 aggregationlevel	O	O	O

Table 6. Application Profile for the General Element (From: Version 1.3, November 2002)

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4.   Runtime Environment

The runtime environment provides a means for interoperability between SCORM-based learning content and learning management systems. Learning content must be interchangeable between the many different LMS's in use at our educational and training institutions. The runtime environment utilizes a predefined system to exchange data elements across different LMS's. The runtime environment is composed of three components, which include launch, Application Profile Interface (API), and the data model. Figure 9 represents the SCORM runtime environment and the interaction of components in that environment.
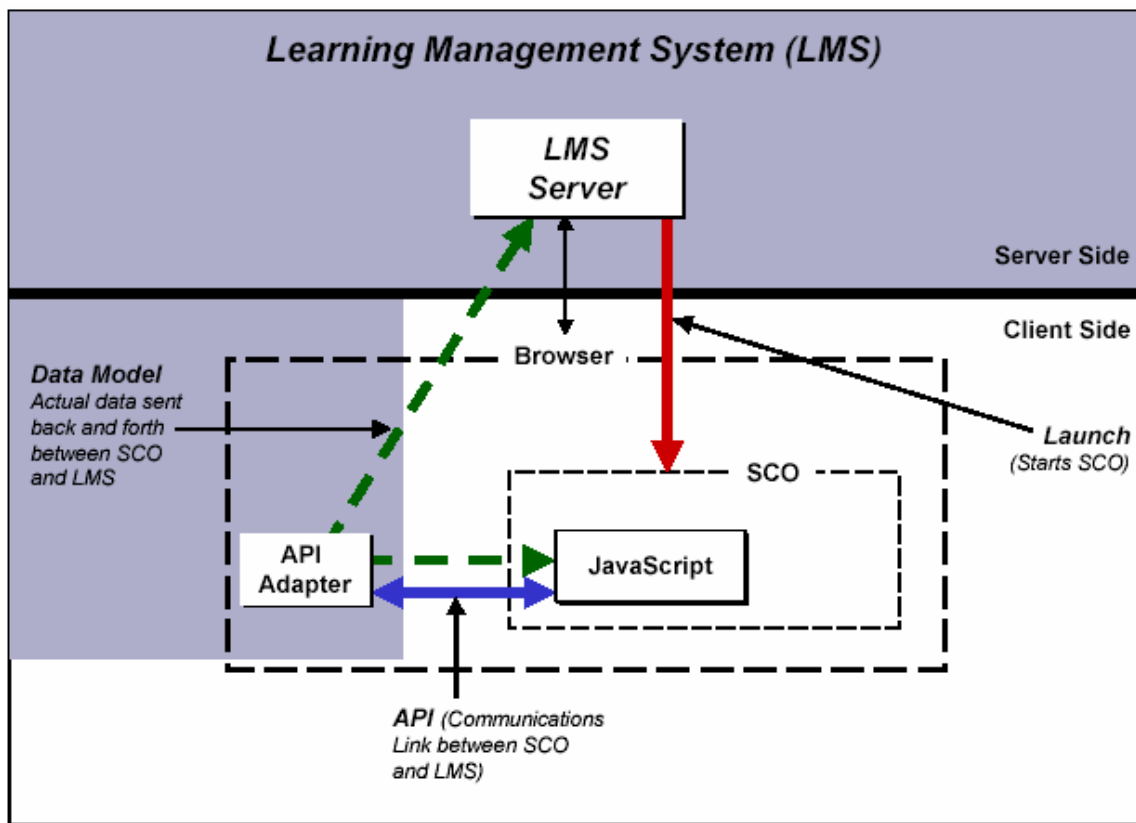
Figure 9.   Runtime Environment Interaction (From Version 1.1, January 2001)

a.   *Launch*

The launch starts the learning content by utilizing a routine method that defines a universal approach for LMS's to start SCO's. This routine defines rules for the starting of communication between the learning content and the learning management

system. The communication set of rules standardize through the utilization of a common application profile interface. The launch model further defines that a LMS can only launch one active SCO at a time. The Launch model also defines that only a LMS can launch a SCO, and that SCO's cannot launch other SCO's (Version 1.1, January 2001).

b. Application Profile Interface (API) and API Adapter

The API is the communication routine that notifies the LMS of the state of the content (e.g., initialized, finished, or in an error condition). The API directs data between the learning management system and the SCO. The API also conceals implementation details from the SCO, promoting reuse and interoperability. The API adapter is piece of functional software that implements and exposes the functions of the API. In all cases, the LMS will responsible for providing the API adapter (Ibid). The functions the API and API adapter will handle include:

- Initiates and closes communications with the LMS
- Permits information to be collected and stored by the LMS
- Permits error messages to be viewed when an error has occurred during communication phases

c. Data Model

The data model is the standard list of data elements used to define the information communicated between the LMS and the SCO. The LMS must maintain the state of required data elements across sessions, and the learning content must utilize only these predefined data elements in order for a successful transaction between the LMS and the SCO. The data model will ensure that the learning management system will get the same data and information form a single SCO regardless of type and brand of the LMS (Ibid).

5. Simple Sequencing

Simple sequencing is the foundation for the SCORM sequence definition model. The term "simple sequence" indicates that the model has a limited number of sequencing behaviors. These limited sequence behaviors do not address artificial intelligence-based sequencing, schedule-based sequencing, and sequencing requiring data from closed external systems, collaborative learning, customized learning, or synchronization

between multiple parallel learning activities. Future versions of SCORM can expect these types of behaviors.

Simple sequencing recognizes only the role of the learner and does not recognize other character roles such as instructors, mentors, or peers. The sequence definition model does not exclude instructors, mentors, and peers in the sequence environment rather it does not define the roles of these characters or sequencing behaviors that result from participation of these characters. Future versions of SCORM will later incorporate other educational actors that include the instructor, mentor, and peers into the sequence environment, which will make the SCORM environment more robust (Version 1.3, November 2002).

6.   Learning Activities Concepts

The first concept is a learning activity, best described as an embedded instructional event or events in a content resource. A learning activity may use a learning resource, or it may consist of one or more sub-activities. In this hierarchy activity, activity accomplishment is in a certain order. Figure 10 illustrates a lesson where a learner must first "Take a Pre-Test" then the learner will be allowed "Attend a Lecture" and finally "Pass a Final Exam." Figure 10 also illustrates a module or chapter of a course. Note the utilization of SCO's and SCA's discussed earlier in this chapter (Ibid).
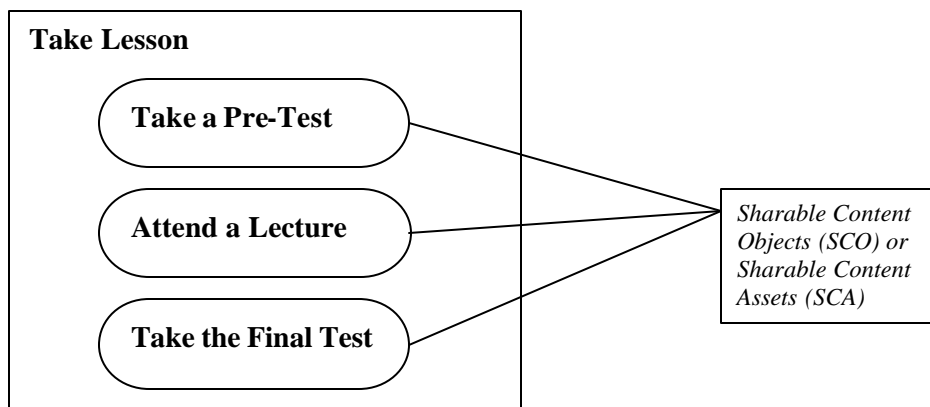
Figure 10.   Activity Illustration (After: Version 1.3, November 2002)

Second, the activity tree is the general term that represents hierarchical representations of learning activities and corresponding learning content. The application profile and simple sequencing refer to the activity tree in the SCORM architecture. The

activity tree allows the application profile to describe sequencing algorithms and behaviors in a non-implementation manner. SCO's and SCA's make up the structure of learning activities, and learning activities make up the structure of the activity tree, which are the basis of a lesson plan.

7. Sequence Definition Model

The basis of the sequence definition model is simple sequencing described earlier. The sequence definition model goes beyond simple sequencing in that it stipulates further application profile behaviors and restrictions. The definition model defines a set of elements used by content developers, which will define certain sequencing behaviors. There is an understanding that LMS software manufacturers will conform and support these element behaviors. Table 7 is a list of these elements and their specific behavior roles (Ibid).

Element	Task
Sequencing Control Modes	Allows the content developer to affect various sequencing behaviors as needed
Sequencing Rules	A set of conditions and a corresponding action of behavior
Limit Conditions	Control certain circumstances regarding when an activity can be delivered.
Auxiliary Resource	Resources made available to the learner when the activity is delivered
Rollup Rules	The process of evaluating the objective and attempt progress data for it's associated child activities
Objectives	Learning activities have an unlimited number of associated objectives.
Objective Map	A mapping of an activities local objective to and from the shared global objective.
Rollup Controls	Types of rollup behaviors specified for an activity
Selection Controls	Descriptions of how the children of an activity should be selected in sequencing.
Randomization Controls	Defined sequencing rules that indicate whether or not a sequencer shall randomly select activities for delivery
Delivery Controls	Actions and controls utilized when an activity is delivered.

Table 7.   Sequencing Definition Model Elements and Tasks

8.   SCORM Version 1.1 Changes from Version 1.0

Version 1.0 outlined the root requirements for the SCORM model. Lessons learned from early SCORM developers drove the improvements for SCORM Version 1.1, while avoiding changing or expanding the original scope of Version 1.0. The following are a list of the most significant changes from 1.0 to 1.1:

- Sharable Courseware Object Reference Model changes its original name to Sharable Content Object Reference Model. This change reflects the fact that the specifications contained in and referenced by the SCORM apply to various levels of courseware components.

- There is reorganization into a more useful structure by grouping specifications into functional groups while keeping each specification in its own sub-section.

- It also streamlined the Computer Managed Instruction (CMI) specifications. The streamlining resulted in the removal of a significant number of data elements in both the Course Structure Format (CSF) and the data model.

- There are improvements to the API in the run-time environment that will require code changes for both content and LMS implementations.

- There is significant expansion of documentation of the SCORM by including more examples, explanations, and details.

9.   SCORM Version 1.1 Changes from Version 1.2

As with the previous version, it was the early developers and participants of ADL Co-Labs, which drove the corrections and the improvements for the changes from 1.1 to 1.2. The changes did not affect the original scope and vision of Version 1.1. The following are the major changes undertaken:

- This version added specific content packaging application profiles derived from the IMS content packaging specifications. It is these profiles, which map the content structure format from Version 1.1 into the general IMS specifications.

- Update of the metadata section to the latest IEEE standards. These updates include changes to the information model and to future XML binding.

- Name changes to the metadata application profiles to better align with the changes to the content aggregation model and in general with the IMS content packaging nomenclature.

- There is an update to the generalized learning management system..

- The grammar and style of the entire model was further refined.

10. SCORM Version 1.3 (Draft) Changes from 1.2

ADL introduced draft version 1.3 on 27 November 2002 to allow the ADL community to review and product test. Below is a list of some of the draft changes introduced by Version 1.3, which to date have not been tested and validated.

- The content model added a new concept of sharable content asset, new SCORM metadata Components, and general clearing up of the content model.
- To the metadata, there was integration of changes to support IEEE learning object metadata changes.
- Content packaging terminology changes for what learning resources are launchable to allow only leaf nodes to reference learning resources on integration of simple sequencing specification.
- There is the introduction of integration of the simple sequencing specification for basic navigation capability.
- The run-time environment data model enhances the incorporation of the simple sequencing specification and requires the set implementation of all run-time environment data model elements.

11. Future Versions of SCORM

The collaboration of E-Learning organization constantly evaluates the standards and specifications for the next generations of SCORM. Future versions of SCORM will be more adaptive, durable, and sharable than the original version. The SCORM collaboration around the world will continue to expand as this new technology takes off and re-invents the E-Learning world. It will be up to ADL and the SCORM collaboration to implement rapid acceptance and global participation. Figure 11 depicts projected future versions and their anticipated capabilities.
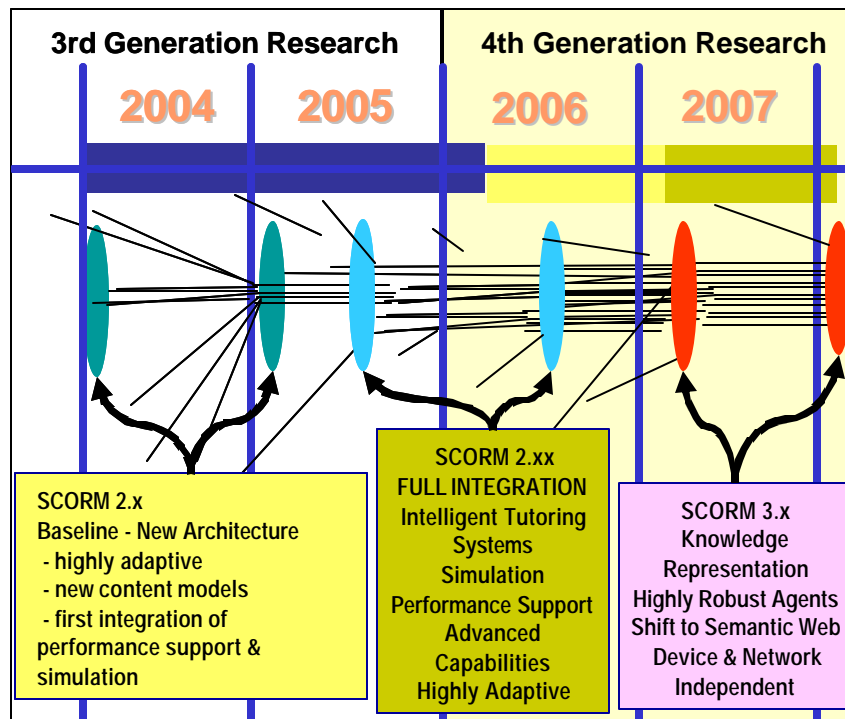
Figure 11.   Future Versions of SCORM and Expected Capabilities (After: SCORM 101, March 2003)

IV.   TRANSFORMATION ISSUES AFFECTING THE ADL INITIATIVE IMPLEMENTATION IN NAVY TRAINING

A.   TRANSFORMATION ISSUES OVERVIEW

In today's Navy training environment, there exist transformation issues, which directly affect the ADL initiative. This chapter focuses on some of those transformation issues. Presentation of these transformation issues requires categorization into the following five subject areas: Organizational Structure Issues, Cultural Issues, Technological Issues, Policy Issues, and Financial Issues. Each subject area discusses transformation issues, which can directly affect Navy training and the DoD's ability to execute programs that take full advantage of the ADL initiative. Therefore, this chapter focuses on the major transformation issues affecting the ADL initiative implementation that are specific to Navy training and DoD as a whole.

B.   ORGANIZATIONAL STRUCTURE ISSUES

Training organizations in the Navy are currently in a state of transformation known as the "Revolution in Training." One of the reasons for this transformation was because of too many training organizations with overlapping and uncoordinated roles in the Navy's training system. Too many training organizations contribute to cost ineffectiveness and increase the difficulties associated with implementing the ADL initiative. (Executive Review of Navy Training, August 2001) In an effort to correct the problems with the organizational structure among many other problems, the Chief of Naval Operations, Adm. Vern Clark, envisioned the idea of the "Revolution in Training" in 2001. As the implementation arm of the revolution, Adm. Clark established Task Force EXCEL, which stands for "Excellence through Commitment to Education and Learning." Task Force EXCEL is responsible for overseeing the implementation of the pilot programs designed to improve and support the Navy's training and education structure. Therefore, Task Force EXCEL is the catalyst for the "Revolution in Training." ("What is Task Force EXCEL?," last acc. 23-May-03)

The previous organizational structure, shown below in Figure 12, illustrates how there were too many training organizations with overlapping and uncoordinated roles in

the Navy's training system. The continuation of these organizations with overlapping and uncoordinated roles leads to a more difficult environment to execute the ADL initiative. Under the previous structure, there existed more than 100 independent commands, making it difficult to manage them from one central point at the now disestablished Chief of Naval Education and Training (CNET) headquarters. The new structure brings the planned establishment of 13 learning centers along with functional capabilities to leverage the synergies of similar training requirements and gain needed efficiencies. The management of 13 learning centers vs. more than 100 independent commands means it could lead to a less difficult environment for the implementation of the ADL initiative. ("New Training Command 'Stands Up' to Support Sailors," 1/10/2003)

Figure 12.   Previous Organizational Structure Example for Navy Training from (Executive Review of Navy Training, August 2001)

The "Revolution in Training" has brought about a major reorganization of Navy training organizations. Figure 13 below, illustrates some highlights of the reorganization. The most notable change is the establishment of the Naval Education and Training Command (NETC), which will oversee all naval education and training except the United States Naval Academy; and the disestablishment of Chief of Naval Education and Training (CNET), which will turn over all command functions to NETC. Other changes

include the establishment of the Naval Personnel Development Command (NPDC) and 13 planned learning centers, which will standardize the training development and delivery process for all sailors in the Navy. ("How is Navy Training Being Restructured?," Last acc. 23-May-03)

Chief of Naval Operations

Naval Education and Training Command, NETC
Echelon II Headquarters

Naval Personnel Development Command (NPDC)
Echelon III Command

Human Performance Center (HPC)

Three Training Support Commands (TSC's)

Hampton Roads

Great Lakes

San Diego

Thirteen Planned Learning Centers

Center for Naval Aviation Technical Training, Pensacola, FL

Center for Cryptology, Pensacola, FL

Center for EOD/Diving, Panama City, FL

Center for Information Technology, San Diego, CA

Center for Naval Engineering, Norfolk, VA

Center for Naval Intelligence, Dam Neck, VA

Center for Naval Leadership, Little Creek, VA

Center for Personal Development, Dam Neck, VA

Center for Seabees and Facilities Engineering, Port Hueneme, CA

Center for Service Support, Athens, GA

Center for Undersea Learning, Groton, CT

Center for Surface Combat Systems, Dahlgren, VA

Center for Surface Operations, San Diego, CA

Figure 13.   New Organizational Structure for Navy Training

In the new organizational structure, NPDC will exist to support and ensure standardization of training technologies and methodologies to the 13 learning centers, while working closely with the Fleet Forces Command and the lead type commanders to meet the fleet's training needs. NPDC's role in the new structure provides an opportunity for a close relationship with the thirteen planned Learning Centers and with the Navy fleet. This relationship is an important step in providing a better environment for the ADL initiative. Under the new organizational structure, schools providing training in career specialties such as aviation or subsurface will report to and coordinate training initiatives with their respective learning center. Therefore, the thirteen planned Learning Centers can have an influence and positively help the ADL initiative. The thirteen planned Learning Centers comprise the heart of the new organization. Training Support Centers (TSC) located at Hampton Roads, Great Lakes, and San Diego will support the Learning Centers in the daily execution of training requirements. Tailored TSC's support specific geographic regions and provide centralized management for both students and facilities. The focus of TSC's will be fleet scheduling priorities and regional training quota management. "What we have now is a structure that advocates excellence not only in the individual, but also excellence in the management of training and education," said Chief of Naval Operations, Adm. Vern Clark. (Ibid)

Today, the Revolution in Training is bringing major changes in the organizational structure of Navy Training, which is important to achieve the desired upgrades in mission effectiveness and overall efficiency. The new organizational structure provides a better opportunity for implementation of the ADL initiative. In the new organizational structure, it appears that NETC and its subordinate commands can implement training and education policy and programs to include the ADL initiative more effectively and efficiently than under the previous organizational structure.

C.   CULTURAL ISSUES

The unpredictable amount of commitment for the ADL initiative of senior military and civilian leadership is a cultural obstacle. Senior leadership not fully committed to the ADL initiative prefers the traditional, schoolhouse-focused approach to learning. They having very little experience and low comfort levels with computers,

advanced technologies, and emerging policies could explain the reluctance of some senior leadership to commit to the ADL initiative. In addition to leadership, the military services' schoolhouses are a cultural obstacle as well. The military schoolhouses are reluctant to fully support and adopt the ADL initiative when the amount of financial support and infrastructure is dependent upon the number of individual students actually trained on-site. (GAO-03-393 Report, February 2003)

In February 2003, GAO report 03-393 identified a number of cultural issues affecting DoD's advanced distributed learning programs. A cultural issue identified as the major barrier to the ADL initiative is senior leadership's commitment to the ADL initiative, which is not always apparent and varies, with preference for the more traditional schoolhouse-focused learning. Another cultural issue identified was the organizational culture of the DoD being resistant to change as a barrier. Also identified as a cultural barrier was a lack of personal experience with distance learning technology, and compounding this barrier is that unit commanders and civilian managers resist allowing daily ADL training time. An explanation to these barriers could be the lack of widespread computer literacy among older military and civilian decision makers. These cultural issues identified in this GAO report continue to be a barrier to implementing ADL. (Ibid)

A portion of the resistance to the ADL initiative could come from instructors. This resistance comes from those instructors who feel a loss of prestige and perhaps their jobs if the ADL initiative becomes the standard for distance learning. Unfortunately, among instructors, this is precisely how the portrayal of the ADL initiative can often be; however, it does not need to be this way. As time passes, it ought to be more evident that instructors will keep on teaching those courses deemed essential to the overall learning architecture; and as a result, the classroom setting will continue to have a considerable role to play. Additionally, this could also be an opportunity for instructors to retrain themselves as ADL initiative developers. This opportunity if presented properly could significantly reduce the resistance from the instructors to the ADL initiative. (Rosenberg 2001)

Another area of the resistance to the ADL initiative could be the perception of the training leadership. Perhaps their perception is that the student does not want to learn via computer, which could also contribute some resistance to the ADL initiative. A study conducted by OmniTech Consulting Group showed that this was not the case. This study examined the perceptions of training executives, trainers, and learners resulting in interesting findings. For example, more than 90 percent of trainers in the study believed learners need to be instructionally guided through all learning events, only about 50 percent of learners held this view; the other 50 percent expressed more interest in learning how to find information for themselves. Another interesting finding was that more trainers (66 percent) favored group learning over individualized learning, but more learners (56 percent) favored the individualized learning mode. A final finding was that three-quarters of all trainers surveyed stated a preference for learning events taking place away from the work location; however, only one-quarter of the learners actually held this view, with three-quarters favoring learning at the work site. (Rosenberg 2001)

D.   TECHNOLOGICAL ISSUES

The military services are all moving in the direction of Web- or Internet-based access to course content in support of DoD's vision of "anytime, anywhere" delivery of training. The direction that the military services are moving is giving favorable support to the ADL initiative. Addressing the technological issues as they arise, sometimes more than once, is important in ensuring that this type of online access is available while helping increase support for the ADL initiative.

A technological issue that arises more than once is network security concerns, which change over time and may hinder the access to course content. Today's focus on securing networks is an example where this focus in reality could in some instances hinder the learner's capability to access training anytime, anywhere; and if the ADL initiative is involved, it could hinder it as well. Bandwidth is one of DoN's biggest technological issues. Bandwidth in the DoN is generally inadequate to sustain interactive, multimedia training and simulation content, particularly for deployed armed forces. An example of a technological issue is GuardNet from the National Guard Bureau. GuardNet is the telecommunications infrastructure designed to deliver voice/video/data services to

National Guard locations on a nationwide basis through seven regional hubs connected via a high-speed nationwide backbone. The technological issue arose when the National Guard Bureau could not ensure that GuardNet would perform as intended or provide its users with reliable and secure services because the requirements, configuration, and security processes for managing the network were ineffective causing problems with access and bandwidth. These same technological issues with the ability to affect the ADL initiative exist throughout DoD, and acknowledged by DoD ADL officials. (GAO-03-393 Report, February 2003)

GAO report 03-393 submitted in February 2003 to Congressional Committees acknowledged technological issues that affect DoD's advanced distributed learning programs. This report acknowledged two Navy specific technological issues. The first was that small ship communications infrastructure upgrades are required to permit NIPRNET and SIPRNET access. The second issue was that bandwidth limitations for deployed units continue to be a problem. This GAO report also acknowledged six DoD-wide technological issues. The first issue was that bandwidth issues and unresolved network security concerns hinder utility. The second issue was that the ADL initiative standards and specifications are still evolving, making it difficult for programs to keep pace. The third issue was that good military skills-related content is crucial to program success, but currently there is little available because content is more complicated to develop than expected. The fourth issue was that strict firewall policies in some cases limit access to distance learning. The fifth issue was that course conversion process can take longer than expected. The sixth issue was that the development, fielding of, and access to military skills-related content is more difficult and costly than anticipated. The technological issues acknowledged in this GAO report persist as obstacles to implementing ADL. (Ibid)

The technological issues discussed in this chapter, demonstrate that existing course content and technology in DoD does not necessarily enable "anytime, anywhere" delivery. In reality, it continues to be more difficult for the development and fielding of military specific course content than anticipated. Course content that influences military readiness tends to lead to higher costs and slower content accessibility than forecasted.

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(GAO-03-393 Report, February 2003) Although current technological issues may make things look unwelcoming, it is very important to continue with striving to achieve "anytime, anywhere" delivery using what resources are available today to develop momentum, continuously improving as the technology improves. (Rosenberg, 2001)

E.   POLICY ISSUES

Training policies in effect at various braches of the armed forces do not necessarily match the current availability or use of new ADL technologies, often because DoD's training policies are obsolete. (GAO-03-393 Report, February 2003) To address this issue, the Office of the Under Secretary of Defense for Personnel and Readiness has recently published the new Training Transformation Implementation Plan that specifically addresses the use of ADL. Having this OSD-specific ADL policy is important because without it, DoD officials believe that several of the governing policies and documents would continue to be obsolete. The long awaited OSD-specific ADL policy is desperately needed in order to establish a direction that requires the military services to modernize their training regulations and policies that specifically address the use of new ADL technologies. For three years, the Army's primary training regulation has been waiting for a revision. Due to a lack of agreement on integrating new technologies, to include the ADL initiative, the approach of the military service was to use traditional training approaches without the use of the ADL initiative. This is an example of how these obsolete policies have hindered the progression of the ADL initiative. Releasing the OSD-specific ADL policy will end these obsolete policies. (Ibid)

A recent GAO report identified that changes occur at a very slow pace and is a common policy issue in the DoD. An additional policy issue identified was that published OSD policy, during the time of writing the GAO report, addresses the use of ADL without specific OSD policy or guidance. Further explanation revealed that the Joint Staff and services had no requirement to change or update their regulations to reflect the availability of or use of new ADL technologies and could not develop coordinated and integrated policy that reflects guidance that promotes ADL implementation. These policy issues identified in this GAO report need updating in support of policy that contributes to the advancement of the ADL initiative. (Ibid)

F. FINANCIAL ISSUES

As part of the Revolution in Training, the Navy's training system must become more efficient and more like an investment rather than a cost. (Executive Review of Navy Training, August 2001) An excellent example of this would be the financial success involving the Army's Battle Staff Noncommissioned Officer Course conversion to an ADL format, which resulted in $2.9 million annual cost savings while maintaining student performance. (GAO-03-393 Report, February 2003) Currently, Navy training is not keeping pace with current system development and acquisition, which hurts the ADL initiative. (Executive Review of Navy Training, August 2001)

Financially, Navy training is big business. It is also the area where the ADL initiative can make the biggest impact — being more like an investment rather than a cost. The cost of training and training-related activities is roughly 14 percent of the Navy's total annual funding, or about $10 billion dollars. Involved in the big business of Navy training is tens of thousands of sailors, DoN civilians, and contractors. (Ibid) On the other hand, the DoD as a whole spends more than $17 billion annually for military schools that offer nearly 30,000 military training courses to almost 3 million military personnel and DoD civilians, and a majority of it is to sustain readiness. (GAO-03-393 Report, February 2003)

A Navy specific financial issue identified as a barrier is that a funding gap exists for course content development funding. Another Navy specific financial issue identified a need for additional funding for classroom hardware to run course content—Navy and Marine Corps Intranet (NMCI) hardware is inadequate to execute all web based training course content. The final Navy specific financial issue identified that anticipated return-on-investment savings are notably less than anticipated life cycle costs and significant up-front costs are required to realize long-term return on investment. (Ibid) Until the Navy addresses these specific issues the ADL initiative will not move ahead.

A majority of funding and budgeting issues identified back in 1997 for DoD's distance learning programs continue to linger unresolved. For fiscal years 1999 all the way through 2002, DoD's distance learning programs had funding allocations of more

than $431 million, which was less than 1.3 percent of its total training budget during that period. This funding allocation did not always match the needs of implementing the ADL initiative requirements, which were difficult to determine for a new program where the SCORM architecture is constantly evolving and the technology is changing rapidly. It appears that future expected requirements of the ADL initiative are going to exceed the planned funding levels for some time. Through fiscal year 2007, DoD program officials project that a funding gap of more than $600 million will exist. This funding gap calculation comes from estimating that over $2.2 billion is required for ADL programs and currently only have programmed in the budget about $1.6 billion (Ibid). An additional setback to the ADL initiative is when, according to DoD program officials, anticipated training savings gained from ADL implementation vanishes from the budget before there is a chance to realize it, which hurts the ADL initiative. The expectation that there will be a decrease in the number of students receiving traditional schoolhouse training continues to be a major concern with some training facility commanders. This concern continues to come from the belief that ADL implementation will cause a reduction in financial resources as the number of students in the classroom decrease. In conclusion, budgeting for the long-term use of ADL is an on going debatable issue between the Joint Staff and the services (Ibid).

The same GAO report documented that DoD-wide budget and funding issues for the long-term use of ADL are unresolved, and operations and maintenance funding for ADL is difficult to manage because it is available for obligation with only one-year lead-time for course conversion, which can easily exceed 18 months. Also revealed was that current projected funding does not ensure full implementation of the program and funding is dependent upon combatant commanders' voluntarily reprogramming funds. Lastly, the GAO report acknowledged that the current financial planning, programming, and budgeting system does not take into account the joint courseware funding and management needs. (Ibid) It is imperative to align and update OSD ADL policy so that service specific policies are updated thus allowing the ADL initiative to flourish.

G.   TRANSFORMATION ISSUES SUMMARY

Difficulties in sustaining unit and individual readiness over time illustrate the need to transform training within DoD (Ibid). The ADL initiative seems to provide opportunities for significant learning and performance improvements, anytime and anywhere. The gained learning, performance, and readiness opportunities from ADL initiatives could prevail over return-on-investment calculations. The process of developing exceptional and pertinent military specific content that increase both learning and readiness is vital to the ADL initiative implementation success. The existing organizational, cultural, technological, policy, and financial issues, produce multiple implementation barriers to the ADL initiative that DoD leadership must overcome before it can fully realize what appears to be obtainable benefits of improved learning and performance which generates improved readiness. Ignoring the transformation issues discussed in this chapter causes inefficient Navy training by antiquated and fragmented organizations, policies, and financial resources without focus to continue which increases the difficulties with the ADL initiative.

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V.   NAVY EDUCATION IMPLEMENTATION ISSUES TO THE ADL INITIATIVE

A.   NAVY EDUCATION OVERVIEW

Memory, learning, and motivation are the mental constructs, which both education and training share. To differentiate between the three mental constructs one must look at their goals, outcomes, and application of the principal instruction. Learner result comes directly from the knowledge gained from an instructional course. Educational institutions in the Navy have historically been concerned with both the social and intellectual development of a student. In educational institutions, there are no limits to how elevated the learner outcomes should be. The thought of overeducating a student is not an issue to an educational provider at our Navy institutions. In contrast, to a training provider the thought of overtraining a student translates to cost ineffectiveness. It is this fundamental difference, which distinguishes education from training in the Navy.

Graduate education is an essential element in the career-long development of Navy officers that produces warriors who are highly advanced scientifically and technologically. It is also extremely important for the Navy to maintain a highly skilled enlisted force in an environment where career-long access to educational opportunities is given. The availability of college and graduate level military education "anytime, anywhere" with minimal resident times will make education and professional development a career reality for all members of the Navy.

Advanced education in the Department of the Navy includes many military and civilian institutions. In this thesis, the authors will focus on postgraduate education at the Navy Postgraduate School (NPS) and the Naval War College (NWC). NPS and NWC's online content provides education continuum for the officer, enlisted and civilian workforce. The Navy E-Learning website designed to provide connectivity to its active duty, reserve, and civilian personnel gives access to both NPS and NWC's online content. Navy personnel have access to this service at no cost. Consider that typical universities that Navy personnel attend can cost as much as $1,500 per class and can take up to several months to complete. Sailors can complete pre-requisite classes for a master's

degree at NPS and NWC via E-Learning at a fraction of the cost of typical universities (Grosz, June 2003). The goal of NETC is not to close down traditional schoolhouse educational institutions but to expand the distance learning capabilities of NPS and NWC. NETC hopes to reduce residency time for postgraduate education and improve access to education opportunities for all Navy personnel.

B.   CULTURAL RESISTANCE

The Navy is pouring money and assets into the ADL initiative and is concentrating most of its efforts on the technical and strategy issues dealing with E-Learning. However, the human element is the most powerful aspect of any technology solution. A recent study targeting government and military users stated that 71% believe that cultural resistance is the largest barrier to E-Learning (e-learning Magazine, April 2001). Upgrading and replacing technical infrastructure is the easy part. Shifting the human perception and attitude will take a long period to accomplish. The success of E-Learning in the Navy depends on the service members and civilians using it. The ADL initiative is an enterprise-wide solution that represents a major change in the work process and the role of learning within the Navy educational system. In general, for change of this magnitude, the majority of people resist change regardless of its benefits.

Learner resistance will be a large obstacle for Navy education to tackle. This type of resistance is much harder to detect because humans often keep their opinions to themselves. The attitudes toward E-Learning technology can range from total enthusiasm to absolute apprehension. Some learners are resistant to taking on the responsibility for their own learning. These type learners need constant direction and are not self-starters. Other learners prefer the educational experience through social interaction. These types of learners prefer external social stimulation to sitting in front of a video terminal. These types of learners also like direct access to professors and prefer the one-on-one student and professor relationship that is impossible to duplicate on a video screen. Finally, there are those types of learners that have resistance and uneasiness with new learning methods and tools. These types of learners have a hard time taking that first step to utilizing new methods and tools (Geisman, March 2001).

E-Learning is as much a cultural change as it is a technological change. Navy personnel are accustomed to learning in a traditional brick house classroom. E-Learning is a different kind of experience, and there will be resistance. The Navy educational institutions must be prepared to invest in a major E-Learning marketing effort and they must support learning as a legitimate work-time activity. These efforts will lead the way to learning in this new way.

C.   NETC E-LEARNING SYSTEM POLICY ISSUES

The Chief of Naval Operations is the single resource sponsor, and NETC is the single claimant for both the NPS and NWC. On 03 May 2002, NETC issued its policy stating, "The Navy will have one E-Learning system for Navy training and education." The Navy E-Learning system will deliver, track, and manage over 1,000 e-courses at no cost to the user for more than 1.2 employees of the Department of the Navy. The program, which began May 2001, allows students to continue their education, training, and professional development in information technology, leadership, and management including Navy-specific topics via the internet. The policy also appoints NETC as the executive agent for administering E-Learning in the Navy (Single Navy E-Learning System Policy, May 2002).

1.   Learning Management System Interoperability

In December 2001, NETC launched Navy E-Learning Website with the THINQ LMS and a training server. The website will serve over 1.2 million members of the Department of Navy. The THINQ LMS is able to launched and track SCORM conformant content. Currently NPS and NWC utilize Blackboard version 5.5 in conjunction with PYTHON to manage course content, classes, and grades for their students. Version 5.5 provides extended capabilities for support of SCORM objects with the Blackboard system. The new version 6.0 of Blackboard incorporates modular bits of functionality called building blocks. Clients have the ability to create and exchange specialized modules that extend the capabilities of Blackboard's LMS. The Blackboard runtime environment module block makes the LMS SCORM 1.2 compliant. Blackboard version 6.0 is not SCORM metadata compliant but expects to have this functionality in the near future (Blackboard Inc, June 2003).

NETC's direction toward a single E-Learning system provides the learner with a single system with a consistent look, feel, and functionality. It also allows the recording of completed courses in the individual's electronic training jacket. NPS is currently working to upgrade Blackboard to version 6.0 and is working to coordinate the sharing of common data between the NPS PYTHON system, Defense Enrollment Eligibility Reporting System (DEERS), and Blackboard. By doing this NPS will satisfy NETC requirements for LMS interoperability and allow transcripts delivery to the Electronic Training Jacket for the life long education and training continuum envisioned by NETC (Hazard Interview, June 2003).

2. SCORM–compliant Development Efforts

NETC is directing that all new E-Learning materials developed for the Navy become SCORM compliant. It also stipulates that NPS and NWC should submit course content for migration to the Navy E-Learning by following Navy SCORM compliance guidelines (Single Navy E-Learning System Policy, May 2002). Course content at an education institution is different from the course content of a training institution. Training course content is autonomous and interactive while education course content designed to work with the interaction of a professor teaching the course. NPS E-Learning efforts include the offering of thirty online courses with twenty professors and a professional Distance Learning Resource Center (DLRC) staff to oversee the technical and student issues associated with distance learning. Unlike other universities that offer online courses, NPS must deal with student deployment, temporary assignment, and the limitation of shipboard bandwidth issues that are specific only to a military university. NPS is looking at these and other implementation issues associated with current and future course content. A SCORM working group is developing the strategy to accomplish conversion of course content to SCORM compliance (Hazard Interview, June 2003).

SCORM compliance efforts at the NWC and other DoD service schools have been stifled by senior DoD leadership. The ADL initiative called for E-Learning plan that would have standardized seven months of online studies during the total ten-month program at the service schools. The reason senior DoD officials are scaling back on the ADL imitative at our service schools is the fear that scaling back the one year residency

program would be inadequate to produce senior military leadership properly educated in business and policy making. The ADL program director, told the Associated Press "among other factors, considerations were given to the development of interpersonal skills, networking opportunities, personal relationships, and other intangible benefits that a residence program affords." The push from senior DoD leadership to keep E-Learning away from training senior military leadership gives the service school little incentive to become SCORM compliant (Changes to war college scrapped, May 2003).

D. DIGITAL REPOSITORIES

NETC is working with other members of the ADL community in an effort to bring digital repositories to reality. NETC has a member representing Navy education in the DoD digital repository working group, which is currently heading the efforts to develop a common DoD approach to interfacing and interoperating with learning repositories owned by the services. The other members of this working group include members from each service including the National Guard and a joint service member. The group's initial job is to rewrite the inadequate and outdated 1991 DoD Instruction 1322.20 "Development and Management of Interactive Courseware for Military Training." The working group will help rewrite the instruction from the perspective of creating and managing DoD digital repositories. The group's second hurdle is to help define an interoperability approach for DOD repositories. The issues they are addressing include:

- Who pays for Service repositories?
- Where will the repositories be located?
- What do DoD activities use when they cannot afford a repository of their own?
- Who is responsible for a DoD reuse strategy?
- Who decides which specification to adopt?
- Who owns the intellectual property rights to DoD courseware?

There are also projected risks associated with pioneering efforts to create digital repositories. A major risk the working group faces is the "time to adoption" factor. There is a lack of mature digital repository standards available; and early adoption of a standard that fails to gain acceptance with other academic, government, and industry leaders can have a serious setback for Navy education and DoD as an entity. The selection of a viable, long-term standard is plagued with uncertainty because many industry vendors

have their own strategy to ensure a foothold in the digital repository market. DoD does not want to pay for significant infrastructure unless certain it will work and that the rest of the ADL community will adopt that same standard. Many of the competing standards can delay community acceptance and some are still in the process of resolving intellectual property rights issues. The strategy for DoD digital repositories is being refined and tested. There are no near term plans to open up DoD's first digital repository. There are too many issues and problems to resolve before DoD will be willing to invest heavily in opening up digital repositories throughout DoD.

1.   ADL Content Clearinghouse Portal (ACCP)

The ACCP is a DoD prototype information system that conceptually enables DoD personnel to locate and reuse course content assets and objects from networked repositories as envisioned in the original ADL strategy. The Alexandria ADL Co-Lab will develop the ACCP to provide the services with internet browser access to SCORM objects and a registry for indexing objects based on SCORM version 1.2 specifications. ACCP in an information system and is not intended to house actual course content objects. ACCP instead houses metadata and provides a combination of links to prototype digital repositories to include databases administered by the Visual Management System (VMS). Figure 14 is the conceptual model diagram for the ACCP network.
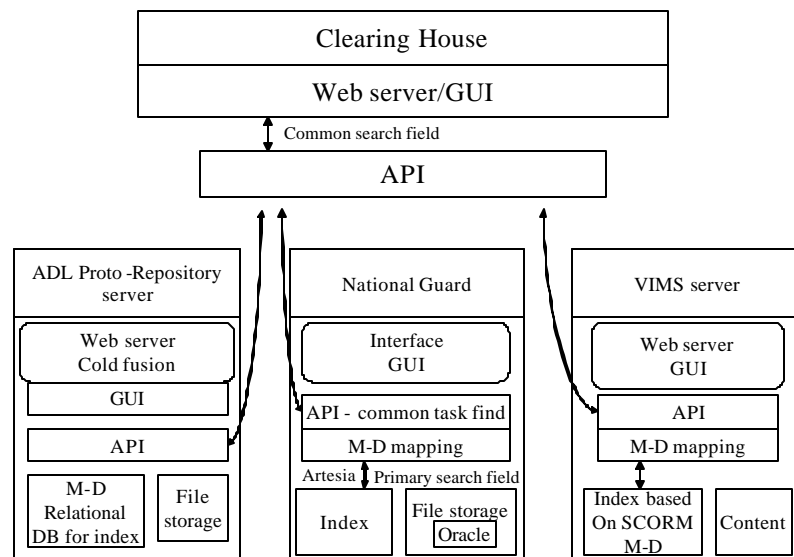
Figure 14.   Conceptual Implementation of ACCP (From: Clearinghouse Portal Requirements Specifications 1.0 Draft, March 2003)

The conceptual model presented in the draft ACCP specifications will generate service-specific feedback. The feedback will further help define service-specific database strategies for storing SCORM course content. Regardless of the database technology chosen by the service, the utilization of SCORM specifications will facilitate search and retrieval across the different service databases (Clearinghouse Portal Requirements Specifications 1.0 Draft, March 2003).

2. Digital Repository Startups

Even with all the uncertainties and risks associated with digital repositories, there has been some success – mostly with civilian academic institutions in this area. Examples of mini digital repositories have already begun to appear on the Web. Figure 15 is a Web view of the University of Wisconsin's Institute for Global Studies database (http://www.uw-igs.org/search/), which features interactive maps of the cold war. A quick search on the Web will yield other private and academic ventures into the field of digital repository startups.

Figure 15.   University of Wisconsin's Institute for Global Studies Database (From: University of Wisconsin's Institute for Global Studies Database Website, June 2003)

3. Learning Objects (LOs)

Navy education institutions are very interested in LO development in the context of use and reuse to reduce the high cost of courseware costs. For example, the text, images, and video developed for one course developed at the Navy Postgraduate School could be reusable by another course developed at the Naval War College resulting in savings of time and monetary resources for NETC. Universities at the forefront of LO development are creating LOs to support academics geared for reuse.

Many educators reject as total nonsense the idea that a course is a collection of independent LOs. There is a point to the rejection of this idea. The point of aggregating LOs for content is an acceptable approach in training where it is particularly effective for teaching rudimentary skills. In performance-based subject matter used in the training environment, the emphasis is on what people want or need to know, not on all there is known on the specific subject matter. For this reason, the adaptation rate and utilization of learning objects will be higher at training intuitions vice educational institutions.

In order for LOs to gain success in academia, educators and professors should not have to worry about LO technology. The prime objective of a professor at a Navy education institution is to focus on teaching and research. Educators should not have to be SCORM architecture experts; rather, the technology and architecture should be transparent to them. What is important at this point in the development of LOs is to make sure educators understand the possibilities, limitations, and benefits of using LOs. A promising end note to LO development and academia is the Massachusetts Institute of Technology announcement early on that they would have open and free courseware LOs available on the Web as they are developed. The MIT website is available at (http://ocw.mit.edu/index.html) and is titled OpenCourseWare. MIT does offer free and open MIT course materials on most courses offered as promised.

4. Navy Development Efforts

Efforts are now underway in the Navy to have SCORM-compliant LOs ready for Digital repositories. Navy schoolhouse and contractor personnel have been working in conjunction with the ADL Co-Lab and have managed to catalog tens of thousands of

SCORM-compliant training objects ready for reuse. Preliminary analysis of select DoD databases indicates general conformity of 67% for the required SCORM metadata tagging. The consensus is that DoD can attain 90-100% SCORM metadata compliance by the end of 2003 (Clearinghouse Portal Requirements Specifications 1.0 Draft, March 2003). The challenge now is to deposit these learning objects into a digital repository. As discussed earlier in this chapter, efforts are now underway by DoD repository working groups to develop a strategy to put these LOs to use as quickly as possible. The money that the Navy is investing now to make objects SCORM-compliant will be realized in future cost savings in the development of new Navy courseware. If only 10% of the objects under the new ADL initiative are reused, the program investment will have been worth the effort in new courseware cost investments.

E.   INTELLECTUAL PROPERTY RIGHTS

The concept of sharing online content, in the form of courses or simply individual learning objects, raises the issue of intellectual property rights. The issue is more complex than merely whether the faculty or the institution owns the course. The issue of intellectual property rights becomes even more complex at military institutions where government-contracted professors can raise the question of ownership of their intellectual property. The ADL initiative opens up an entirely new area of legislative issues that Navy education must deal with before E-Learning can take off. What copyright protection will civilian or military professors have with courseware created for his or her students? What copyrights will a professional courseware software company have with courseware specifically designed for the Navy? With digital repositories beginning to pop up all over the Web, education officials at NETC must not forget to revise current policy to take into account copyright issues for learning objects in DoD digital repositories.

Current copyright laws serve to balance the legal intellectual property rights of authors, publishers, and other copyright owners with society's right to the free exchange of ideas. The Copyright Act of 1976 established principles that make it possible for researchers, students, and members of the public to benefit from access to published information. The provision of fair use allows one to reproduce materials under specific circumstances. In 1998, Congress requested the Copyright Office of the Library of

Congress to study further what impact the current copyright laws may have on E-Learning. The ADL initiative was underway, and congress realized that changes might be necessary to ensure that fair use of information is equally available to students and researchers in the digital as well as physical world. In particular, Congress directed evaluation of the law to ensure the promotion E-Learning. The Copyright Office presented its report, "Copyright and Digital Distance Education," to Congress in May 1999. Some of the recommendations included in the report define "transmission" to include digital as well as analog—eliminating the requirement of a physical classroom (Report of the Web-Based Education Commission, December 2002). On November 2002 the legislative branch gave final approval of the "Technology Education and Copyright Harmonization Act," also known as the "TEACH Act" which put into action many of the recommendations made by the 1999 Congressional report "Copyright and Digital Distance Education". The law supports distance education by expanding the scope of materials used in distance education. The legislation allows professors to deliver course content outside the classroom. The law also provides for the right to covert some analog works to digital format and stores them in server (Copyright Timeline, July 2003).

The issue of copyrights in the digital age is confusing to educators. The fair use provision of the copyright law may force professors to obtain licenses to use the same works in an online course that was not required for a traditional classroom use. Current copyright legislation governing E-Learning is over twenty years old and based on cable and antenna broadcasts of telecourses for distance education. When enacted, legislation and the E-Learning classroom was not even a concept.

The gap between the technology of E-Learning and the language of the current copyright legislation stifles the environment the ADL initiative is trying to create. NETC must ensure that Navy courseware developers not compromise their content and that Navy educators are not discouraged from entering the world of distance education altogether. Needed is further restructuring of current copyright laws by the federal government if the internet is to become an environment for learning envisioned by originators of ADL initiative (Report of the Web-Based Education Commission, December 2002).

F. COSTS AND BENEFITS

E-Learning in the Navy requires a huge financial investment upfront. As with any other investment, DoD comptrollers demand that E-Learning prove its value to the Department. Yet, to date, there is no easy or straightforward way to calculate E-Learning Return On Investment (ROI). The definition of ROI is "the increase in financial value provided by a new investment." This definition works reasonably well when applied to hard measurable costs, such as equipment or hardware purchases. For the intangibles associated with E-Learning, traditional ROI measurements do not work.

One of the largest challenges of E-Learning success in the Navy will be to measure accurately the ROI. Today, most of the Navy models used in determining ROI select and implement technology within a single course, a training pipeline, or a schoolhouse. Few other educational projects will yield a larger ROI than E-Learning. However, measuring ROI is difficult and expensive. ROI models will require revision to include a look at the entire career-learning continuum that includes content, processes, people, LMSs, and how they interconnect together. New performance metrics will require incorporation to determine successfully the impact of E-Learning on the Navy's business processes. ROI will have to consider the overall short- and long-term impact of training that includes:

- How to transfer the knowledge gained?

- Are the Sailors retaining and applying the knowledge?

- How is E-Learning affecting the mission of the Navy?

Answering these questions in terms of ROI translates to dollars and cents; others involve less tangible elements, such as personnel morale, initiative, and responsibility, which can have a significant impact on the Navy's mission. Like any major endeavor, costs will be a major barrier to full implementation of the ADL initiative (Bassie, Fall 2000).

1. Components of Costs for E-Learning

The cost for traditional schoolhouse institutions has three components: direct, indirect, and opportunity costs. Direct costs for the Navy educational institutions include the salaries of professors, payments to outside vendors, facility maintenance, production

and distribution of materials, travel expenses, and administrative and support costs. The direct costs related to E-Learning include the development or purchase of courseware and hardware for delivery. The elements of cost associated with E-Learning have both marginal and fixed costs. The marginal costs are those that vary with the number of learners. Fixed costs are those that do not vary with the numbers of learners. Indirect costs are the wages and benefits paid to the learners while they are learning. Available Data shows that indirect costs of traditional schoolhouse learning are on the average at least as great as the direct costs. Opportunity costs are equal to the lost productivity costs when sailors leave a duty station to attend and educational institution in the Navy. From available data, it is reasonable to estimate that it is twice the indirect costs. Added up the typical costs of schoolhouse education are five times the direct costs thus making E-Learning such an attractive tool for the military educational institutions (Ibid).

2. Navy ADL Program Financial Challenges

Projected Navy ADL program requirements for FY 03-07 are set at $591 million. The estimated costs to infrastructure upgrades come out to $232 million. Add to that the estimated costs of $359 million required developing the courseware for the ADL program and the ADL program comes up major shortfall of $128 million. From FY 99-02 the Navy spent only $28 million on the ADL initiative, which represents 0.34% of its entire training budget of $7,850 million. The allocated $28 million still left a budget request shortfall of $18 million (GAO-03-393, February 2003). Figure 16 helps illustrate funding disparity in the Navy.
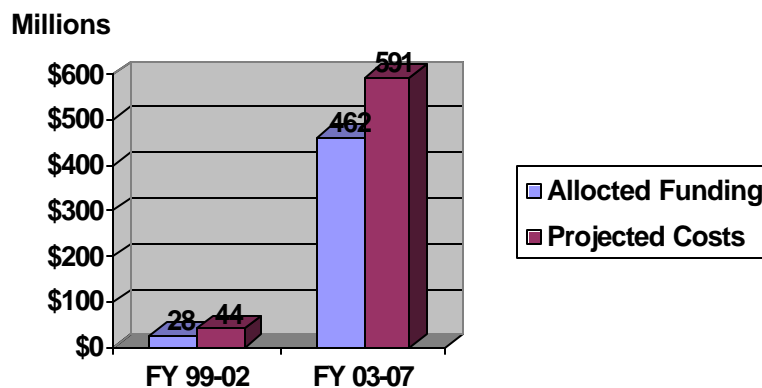

Figure 16.   Navy ADL Program Financial Shortfalls

Future funding requirements will not meet the projected costs. There are to two reasons for the disparity between the allocated and estimated costs. First, ADL funding requirements are often difficult to determine for this new and advanced technology where evolving standards change rapidly. Second, one year operations and maintenance funding is difficult to manage for courseware development, which often exceeds 18 months and cost more than anticipated (Ibid). The ever-changing standards to the ADL initiative will continue to plague Navy budget analysts in the future.

G.   POLICY ISSUES

Of the largest barriers to the ADL initiative was the lack of direction from the top. On 10 July 2003 the Office of the Under Secretary of Defense for Personnel and Readiness introduced the DoD Training Transformation Plan also known as the T2 plan. The T2 plan is comprehensive plan that will provide systemic and ongoing process to build vibrant, capabilities based training for the DoD in support of national security requirements across all active and reserve services components. The common theme in the new T2 plan is a more inclusive definition of "jointness" that includes not only the service components but also state, federal, international, and nongovernmental organizations. The plan seeks to build upon what the individual services previous work on the ADL initiative to create a single Joint Distributed Learning Initiative. The T2 plan gives clear and definite direction on the ADL initiative that allows the services to rewrite outdated instructions, which lacked any mention of E-Learning and the ADL initiative (Training Transformation Plan, June 2003). The T2 plan also sets decisive and attainable milestones for the ADL initiative that includes:

- The creation of a Web-based curriculum for Joint Military Leader Development by January 2004.
- The alignment of the service specific ADL initiatives in support of other T2 program developments by October 2003.
- The creation and release of the first Web-based delivery tool for the joint individual education and training resources by February 2005.
- Shift the joint education and training prototype efforts to the services by March 2006 and to international and non-governmental partners by October 2009(Ibid).

H.   TECHNOLOGICAL CHALLENGES

The Navy can no longer be view postgraduate education as a campus-based event. Technology is driving the demand for new forms of higher education because the pace of change in the Navy is requiring Officers constant retraining. Education will increasingly be required on an ongoing basis as the Navy evolves with ever-increasing change. Technology will also provide The Navy with alternate forms of postsecondary education delivery that will better meet the ongoing education needs of Naval officers.

Technology in postgraduate education affords the opportunity to create a learning environment that is learner-centric, individualized, and interactive. Specifically, E-Learning enables the Navy for the first time to put knowledge and learning within reach of all 1.2 million members of the Department of the Navy, at the time and place where there is a need for knowledge. E-Learning education offers the potential of thousands of classes on hundreds of subjects available anytime night or day, at any place, at the convenience of the student. Traditionally postgraduate education has been both place-bound and time-bound; we now have the opportunity to have anytime, anywhere learning. Although the source of knowledge and learning has traditionally been the professor, knowledge and learning is now available over the Internet.

The largest technological hurdle that will impede E-Learning in the Navy education system is accessibility to broadband. In order for E-Learning to work, the sailor must have capability to download complex, content-rich resources. To make the most of E-Learning, the Navy must have ready access to its supporting technology to truly have the anytime, anywhere learning experience the ADL initiative is envisioning. The Navy must nurture and expose sailors to E-Learning technology at boot camp, officer's candidate school, reserve officers training corps programs, and the Naval Academy. Access is more than sitting in front of a computer terminal and simply connecting to the internet. All Naval personnel must have access to broadband connectivity and it must be convenient and affordable for the sailors from boot camp to retirement. It must also offer the sailor the opportunity to find and download content-rich, complex, and interactive resources. The technology will have to be available whether the sailor is working onshore or at sea. Access also implies that that once sailors have connectivity, they will be able to

find and utilize the applications fit for their learning needs. Without broadband access at our ships and at home, there will be little demand for the E-Learning conceptualized by the ADL initiative.

1. Broadband Requirements

Broadband refers to the transmission of large amounts of wired or unwired data electronically. The higher the broadband connection the richer the online E-Learning experience is for the sailor. Sailors will require three geographic access points to broadband: home, shore stations, and at sea on a ship. Shore stations for the most part are highly connected to broadband. Ships at sea have restricted broadband capability and therefore mission essential use gets most of the available bandwidth. Simple internet and email connectivity gets limited bandwidth in the shipboard environment. E-Learning on a ship consumes a lot of bandwidth depending on the number of students who attempt to access it simultaneously and the bandwidth requirements of the courseware. Considerations for ship communication infrastructure upgrades to permit Nonsecure Internet Protocol Router Network (NIPRNET) and Secret Internet Protocol Router Network (SIPRNET) access for E-Learning must be at the top of the agenda for the line commanders in order for the ADL initiative to become a reality. There is also the issue of bandwidth limitations for deployed units. Current communications infrastructure does not address anytime, anywhere learning initiatives for deployed navy units overseas. Just like the ships, needed infrastructure upgrades will ensure all Navy personnel have access to E-Learning even while deployed in remote locations.

The sailor's home is the most crucial area where broadband connectivity is required. As broadband becomes more prevalent and accessible across the Unites States and prices drop to current dial up internet provider prices, broadband at home will be the standard and not the exception. It is unlikely that sailors will have free time to conduct much E-Learning at work while stationed at shore-based station. A ship at sea offers an abundance of free time for E-Learning but shipboard bandwidth remains an issue for the near future.

2. Broadband Usage Statistics

Figure 17 indicates that there are 30 million broadband connections across the United States, which equates to 16% of all American homes having broadband access. High-speed Internet adoption at home continues to rise sharply in the United States, increasing by 50% from March 2002 to March 2003. That is double the number who had a high-speed connection at home at the end of 2001 and, as noted, a 50% increase in the past year. In not quite three years, the United States has witnessed a five-fold increase in the number of people who go online with a fast connection at home (Horrigan, May 2003).

No statistics are available that show home broadband connectivity for Navy personnel. One can assume that the numbers mentioned would be higher for Navy personnel. Navy personnel are nearly 100% internet literate, are younger that the average population, and tend to live in populated areas, which would indicate higher broadband usage statistics. The Navy population is still a long way from 100% broadband connectivity required for the E-Learning experience and the vision of ADL initiative
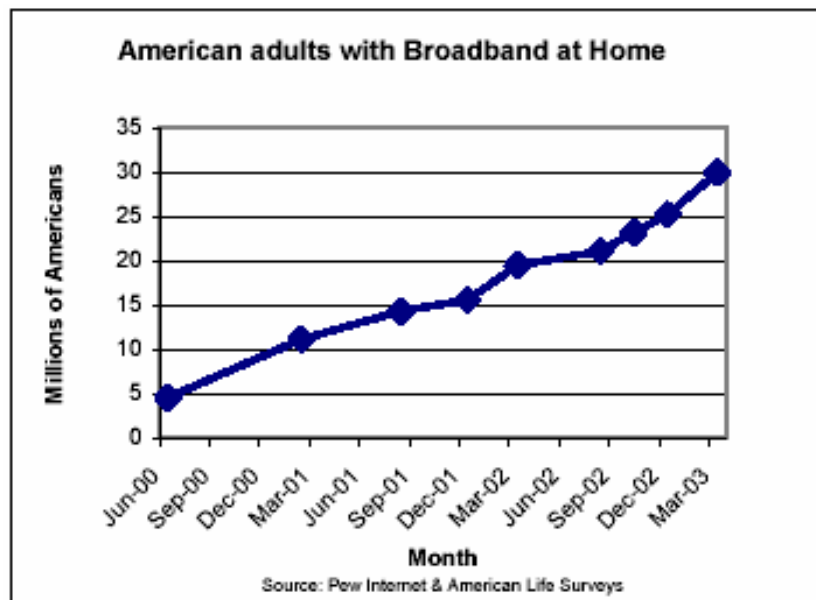
Figure 17.   American Broadband Usage Statistics (From: Horrigan, May 2003)

The importance of high-speed connection is essential for E-Learning. Figure 18 indicates that persons with dial up modems are not as likely to utilize the internet for multimedia rich applications as persons who have broadband access. The statistics show evidence that people are several times more likely to stream and download music than people with only a dialup connection. Streaming and downloading music would be similar tasks that an E-Learning student would utilize while participating in an interactive E-Learning course on the web. The issue of broadband connectivity for everyone in the Navy is an issue that NETC will have to address if the ADL initiative is to become fully successful. Perhaps subsidizing broadband connection charges if the sailor utilizes E-Learning is one way to ensure 100% broadband connectivity for those sailors and officers seeking graduate and postgraduate education for their careers.
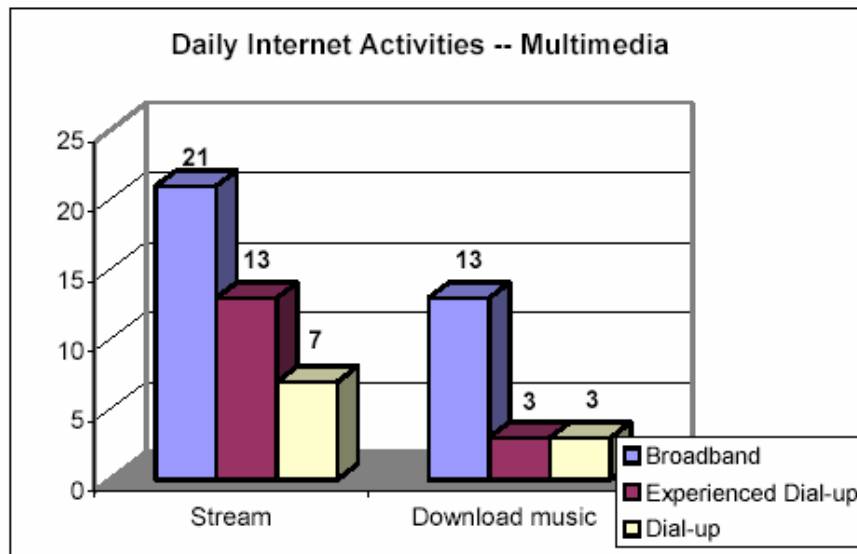
Figure 18.   Daily Multimedia Activities Statistics (From: Horrigan, May 2003)

Once the Navy addresses the technological issues, technology will greatly expand access to higher education and fundamentally change the models of education with which the Navy is familiar. In particular, technology will enable education that is learner-centric, individualized, and interactive, making education far more relevant to the needs of individuals. It will allow for anytime, anywhere learning, which is attractive to busy sailors and officers, and it will enable true continuum learning environment that ADL envisioned.

I.   LEARNER ROLES AND ISSUES

Nearly all students in the Navy are accustomed to learning in the traditional brick house classroom under direct supervision of a educator. The ADL initiative will feature and require the use of distributed learning. Students will have to change and learn to become more responsible for their own learning. The Naval Postgraduate School features instructor-led video teleconference distance learning classes; under the ADL initiative, these will be the exception and not the norm. To ensure success of the ADL initiative, it is critical that future students of the Navy educational system change the way they think about learning.

Distance learning implies learner-centric education, where learners take responsibility for their own education. The ADL initiative is by its own nature considered a leaner-centric environment. Our current Navy education system features mostly teacher-centered educational instruction. What the teacher does to promote learning through motivation of the student is the focus in teacher-centered instruction: learning events. The teacher is responsible for managing and structuring learning opportunities. Students in the learning process self regulate in learner-centered education. The idea of engaging the student takes on an entirely new meaning with the ADL initiative and the distributed learning concept. The issues of engaging and motivating the future students are most critical if the ADL initiative is to be success in the Navy educational system. Self-motivation and time management of the individual sailor and officer will also be keys to the success of this new initiative. It is critical for the Navy to address these issue first if ADL is to become the system it has proposed to be (The Navy Wide Distributed Learning Planning Strategy, December 1998).

J.   EDUCATOR ROLES AND ISSUES

Faculty members are the sources of knowledge, and their role is to communicate that knowledge to their students. In the information age, the amount of knowledge and information is doubling every few years. It is no longer possible for professors to master more than a small slice of the current knowledge in their field. Yet, with the increasing amount of content available over the Internet, the challenge for students is not access to information and knowledge. Understanding what is most important and knowing where

the best source of that knowledge lies are the challenges. Consequently, the role of faculty in E-Learning shifts to mentoring and directing students to appropriate content. Professors will help students learn how to learn and to find, sort through, and judge the quality of information.

The roles and responsibilities of educators and professors will require re-definition in the learner-centered ADL initiative. Navy education will always have the traditional schoolhouse professors; but with the new ADL environment expands new roles and responsibilities to include, facilitators, mentors, and experts. The professor in combination with the new educator roles will together provide the foundation for the students to learn in the new environment. This new environment will require Navy educators to be proficient at affective and efficient communication to facilitate the teaching, managing, coaching, and monitoring required for the E-Learning students.

Navy educators will always need the current skills required for the traditional podium-based classroom. Success in the new ADL initiative requires these same professors and educators to use distance learning software and hardware and require new skills for the learner-centered model of learning and teaching. For most all educator and professors this will be the largest mental shift in thinking on the education of sailors and officers they have ever encountered in their careers as educators. Without a doubt, this shift from teacher-centric to learner-centric will encounter resistance from the traditional educators and professors. It will be up to the pioneers of distance learning at NPS and at the NWC to clear the path and open up the doors for the ADL initiative (Ibid).

K.   THE CHANGING REQUIREMENTS OF NAVY EDUCATION

Our Postgraduate schools in the Navy are set up to define the learning that is required. They do this through required courses, prerequisites, and a specified number of credit hours required in attaining a masters degree. They also do this at the course level, with each professor deciding what he or she will teach in a given semester. The schools certify learning by having professors assign grades to student performance and by counting credit hours completed toward a degree. For the most part the schools certify only the learning done onsite, with some provision for the transfer of credits from elsewhere. In an E-Learning environment, learning experiences may be from anywhere,

not only from other universities and colleges but also from personal study or service training and work experience. The role of our Navy postgraduate schools will be to certify learning regardless no matter where it takes place. This will change the schools role from mandating classes and credit hours to developing measurements of knowledge and skills.

L.   ROLE OF CURRICULUM OFFICERS AND SUPPORT PERSONNEL

As the roles and responsibilities of the students and professors will change at our postgraduate institutions so will the roles of the curriculum management officers and other curriculum support personnel. The implementation of the ADL initiative will force a shift from managing a curriculum to that of managing the quality of learning objects in the schools' digital repository. The responsibility of managing the learning objects and the digital repository will require very advanced knowledge of SCORM architecture requirements.

Other responsibilities may include the acquisition or development of distance learning instructional modules for use at their institutions. The curriculum management officers will work closely with the schools' administration and faculty in coordinating the use, reuse, and storage of learning objects. Developing high-quality E-Learning courses is beyond the capability of most faculty members. It requires the skills of a team of instructional designers to participate in the development and wide distribution of online courses. It is in this area where curriculum officers and support personnel can serve to best support the ADL initiative (Ibid).

M.   CHANGING THE QUALITY OF ONLINE COURSES

The quality of the offered online courses is vital to the success of the ADL initiative. Many of the current online courses are of poor quality, amounting to little more than professors putting their lecture notes on Blackboard. The modification of course content is necessary to take us beyond simple text-based, electronic correspondence courses that are the standard today. Modularity and interactivity are the two most significant priorities in developing online courses.

Modular content enables students to individualize their learning experience by skipping parts that they already know and focusing on modules that are relevant to their individual needs. The development of new online course content with SCORM architecture as learning objects is crucial to the quality of the course. These learning objects address a particular objective, which links to form modules and courses. SCORM architecture allows these learning objects to be interchangeable and therefore sharable.

Effective online content is also highly interactive, utilizing the processing power of today's computer to process student responses, provide specific feedback, and adjust instructional paths based on student performance. Navy education must focus on the quality of course content for E-Learning to be a successful endeavor.

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VI.   SUMMARY

A.   INTRODUCTION

Just as information technology advances contribute to a revolution in military affairs, they also contribute to a revolution in military education and training. The advanced distributed learning initiative is an integral part in the future success of E-learning. This could extend military education and training beyond the traditional brick-and-mortar schoolhouse to the field and fleet. E-Learning can provide continuous and career-long education and training opportunities never before realized by DoD.

Military education and training of today does not meet the challenges and goals of Joint Vision 2010. Education and training professionals are increasingly relying on information technology to keep up with rapid changes in the world. E-Learning could provide NPS and NWC college graduates with a means of updating their education and offer them an always available, needs-based education for the remainder of their career. Ultimately, E-learning as envisioned by the ADL initiative would allow joint military professional education and training to reach a larger proportion of officers and enlisted military members.

Many civilian and military higher educational institutions now offer quality courses and curricula through E-learning channels. However, E-learning is not necessarily a replacement for seminars, which have proven to be an extraordinary learning environment. Rather, E-learning will complement seminars and make them better. As digital video technology develops, virtual seminars will emerge and provide powerful learning environments. This will lead to an unprecedented education and training experience for military members. Military educators will be able to offer an increasing number of innovative educational delivery and access options to officer and enlisted military members in the field and fleet. Providing more E-learning opportunities to our reserve officer and enlisted members will improve their integration with the active components and make for a better fighting force.

B. CONCLUSIONS, CRITICAL SUCCESS FACTORS, AND RECOMMENDATIONS

1. Changing the Roadblocks to Success

a. Cultural Resistance Eliminated

Cultural resistance to E-Learning is a major roadblock to the ADL initiative. There is a need for increased commitment to the ADL initiative by senior military and civilian leadership within the services of DoD. Familiarity with the benefits of E-Learning by senior leadership is essential. Frequent, supervised exposure of E-Learning and its benefits in a classroom setting can help increase the overall commitment to the ADL initiative by senior leadership. A positive personal experience with E-Learning makes it easier for senior leadership to show support for the ADL initiative.

Another portion of the cultural resistance is from the military services' schoolhouses. Instructors should feel they are a resource for E-Learning and not be concerned with losing their jobs due to the ADL initiative. Instructors ought to perceive an opportunity with E-Learning and become ADL initiative developers or assist courseware developers by supplying course content and making it more interactive and interesting to the distance learner. Support for the ADL initiative by the schoolhouses would also increase if the amount of funding and infrastructure were not dependent upon the number of individual students actually trained on-site. Reducing these cultural resistances is vital in removing the roadblocks that inhibit the success of the ADL initiative.

To ensure that there are no cultural barriers to success, the authors make the following suggestions.

- Navy executive leadership must embrace E-Learning for the ADL initiative to have a successful launch into our education and training system. This commitment from the top is crucial in making DoD members take the movement to E-Learning seriously.

- Use existing executive leadership conferences and seminars to introduce E-Learning to Navy executives. Conducting live demonstrations at these seminars and answering questions about the e-learning program will go a long way in courting the executive policy makers to ADL.

- Perhaps incorporating at least one E-leaning course at the sailors first A school would be a good mechanism for introducing ADL concepts to the new sailors of the fleet.

- Introducing E-learning to Navy middle managers such as department heads, and chief petty officers is vital in promoting ADL. Using existing Navy leadership training unit's courses targeted at mid level managers to promote the ADL initiative and E-learning accomplishes this task.

- A policy should be in place for scheduling time for learning into each person's day. Scheduling time for learning needs to carry value to learner success in the DoD.

- Equipment and the network should all function well. The most important thing to remember is that a well-designed program, which, offers the right material, and publicized well, will take off through word-of-mouth among DoD members. The challenge is to get a good program in place that meets learner needs and then help DoD members make the cultural change in the way they learn.

E-Learning is as much a cultural change as it is a technological change. Navy personnel are accustomed to learning in a traditional brick house classroom. E-Learning is a different kind of experience, and there will be resistance. Education and training transformation begins by changing the way people think and the way organizations operate. Creating, storing, imparting, and applying new knowledge throughout the force, individually and collectively, will foster this change.

b. *Organizational Restructuring Success*

Too many training organizations contribute to cost ineffectiveness and increase the difficulties associated with implementing the ADL initiative. The continuation of these organizations with overlapping and uncoordinated roles leads to a more difficult environment to execute the ADL initiative. There once existed more than 100 independent commands in the organizational structure of Navy training. This made it difficult to manage them from one central point at the now disestablished Chief of Naval Education and Training (CNET) headquarters. Restructuring was important in making it more controllable and in enforcing standards and a friendlier environment for the ADL initiative. Restructuring brings the planned establishment of 13 learning centers along with functional capabilities to leverage the synergies of similar training requirements and gain needed efficiencies. The management of 13 learning centers verses more than 100

independent commands means it could lead to a less difficult environment for the implementation of the ADL initiative.

Today, the Revolution in Training is bringing major changes in the organizational structure of Navy Training, which is important to achieve the desired upgrades in mission effectiveness and overall efficiency. The reorganization provides a better opportunity for implementation of the ADL initiative. It appears that reorganization will allow NETC and its subordinate commands to implement training and education policy and programs including the ADL initiative more effectively and efficiently than preceding the reorganization.

Now that the reorganization will improve the structure, the authors recommend appointment of a change agent champion for the ADL initiative to the learning centers. The change agent, with an information technology background, will work directly for the commanding officer and is responsible for implementing courseware conversion with adherence to the SCORM architecture and promoting the ADL initiative. This change agent will now work in an environment that has the right structure to support the success of the ADL initiative.

c. Supportive Executive Direction and Purple Policy

The Clinton and Bush presidential administrations, Congress, and DoD have provided considerable direction and interest in ADL. The current direction is to expand the ADL initiative efforts and to leverage a common DoD joint environment with a single goal verses service-specific goals. This direction will enable DoD to conduct efficient and cost-effective education and training in an E-learning environment.

Recently, ADL gained a major joint policy victory by the launch of the training transformation plan in July 2003. To attain the ADL Vision, the T2 plan calls for the reorganization of service-specific ADL programs in a joint effort and full funding for successful mission accomplishment. The Secretary of Defense directed that training transformation be incorporated into the Fiscal Year (FY) 2004 program objective memorandum. The Secretary of Defense also called for the reprogramming of FY 2003 money to accelerate the foundation of this urgent program. Oversight for the T2 plan falls

under the Office of the Under Secretary of Defense for Personnel and Readiness and includes program development, coordination of annual budget submissions, and oversight of execution (Training Transformation Plan, June 2003). The T2 plan was a little late in development but proposes to redirect service specific efforts into a congruent and joint plan, which will propel the ADL initiative in the right direction. With joint support for this ADL vision, DoD can start implementing the transformation in education and training that will provide anytime and anywhere instruction.

d. Bandwidth: The Final Barrier

The more powerful the capability to transmit data, the richer the online experience is for E-learning. Broadband carries with it powerful multimedia learning opportunities, the full interactivity of instructional content, and the quality and speed of communications. Broadband access today is several hundred times more powerful than dial-up. Broadband access tomorrow holds even greater promise for E-learning.

To ensure the anytime anywhere learning model becomes a reality, the Navy must be ready to commit bandwidth availability to E-learners onboard ships, while on deployed status, and at home. Line commanders and IT system planners must take E-Learning into account when designing and building future communication links to our deployed ships and ground units. The authors recommend incorporating the E-learning broadband requirements into all current and future DoD IT acquisition programs, enabling future deployed IT systems to handle the requirements for anywhere-anytime learning.

Inexpensive broadband availability at home will always be a question of where you live geographically. We are still many years from realizing inexpensive broadband accessibility for the entire home market, therefore Navy e-learners only other option will be to access broadband at work or public libraries. As more E-learning courses emerge on the Web, there will be a real need for each Navy command to make E-learning part of its daily routine.

With the realization of the ADL initiative, there will be little need to travel for simple courses such as the leadership training. Where will Navy personnel go and

take these courses online? The completion of these courses after normal working hours or during routine work hours is unlikely. The authors contend that there must be a designated E-learning area separate from the command working space for E-learners to take online courses. Each Navy command will have to evaluate it's specific educational needs and designate a room or area where command members can participate in E-learning while not being burdened by work-related activities and assignments.

The authors recommend the Navy subsidize E-Learning by making it affordable for all sailors to have broadband access. Subsidizing the subscription costs of broadband connectivity ensures that sailors complete E-learning courses. This benefits the Navy by saving travel costs and tuition fees. The authors suggest a subsidy model that increases with the amount of E-learning courses taken by the sailor. For example, printed certificates are evidence of successful completion of E-learning courses. The more certificates turned in, the higher the subsidy the Navy would pay for the broadband subscription fees. Ensuring the availability of E-learning at home moves the Navy one step closer to the anytime anywhere learning concept

e. *Financing DoD E-Learning*

For the FY 99-02 years, the Navy spent only 0.34% of its entire education and training budget on the ADL initiative. Of the $28 million spent, there was a shortfall of $16 million for those budget years. GAO has also predicted a shortfall of $129 million for fiscal years 03-07 (GAO-03-393, February 2003). This under-funding is directly related to the difficulty in funding requirements that are under constant change for this complex technology. The second difficulty is that courseware development often exceeds 18 months, and the ADL initiative funding utilizes one-year operations and maintenance funding which plagues courseware development efforts.

The authors suggest continued full funding for the ADL initiative and a constant review of ongoing requirements, which will better match projected costs to allocated costs. The authors also suggest the program funding be switched from one-year operations and maintenance funding to a multi-year funding options, which will help with courseware development that often takes more than one year to complete.

f.   SCORM Architecture at NPS

The NPS Distance Learning Resource Center (DLRC) makes available 32 E-learning courses for eligible DoD officer, enlisted, or federal employees. NPS DLRC represents a dynamic start to the principals of the ADL initiative. There is great interest by the NPS DLRC to implement SCORM architectural requirements with the school's courseware and learning management system. To date there has been little pressure by NETC or the CNO for NPS to adopt and implement SCORM architectural standards for their E-learning courses. The reason for the lack of pressure is the fact that NPS is an educational institution for DoD officers and most of the early SCORM compliance efforts have been targeted at Navy training programs vice academic programs. The authors contend that NETC will require all training and educational institutions to adopt SCORM architectural requirements for their courseware and LMS; therefore, it would benefit NPS to reinforce their current efforts by attracting its information systems technology and computer science students to perform thesis research in implementing SCORM standards at NPS. The authors detail the future research options later in this chapter for NPS students. Future thesis projects will cultivate SCORM architecture, the ADL initiative, and help lead NPS into the next generation E-learning standard.

C.   FUTURE RESEARCH

SCORM architecture and the ADL initiative are under constant change. We are at the forefront of the ADL vision. In the years ahead, other opportunities for further research exist. The following areas may benefit from further study:

1.   Develop SCORM Compliant Learning Objects for NPS

The ADL initiative calls for all learning objects to be SCORM metadata-tagged no later than September 2003. It would be beneficial for an information technology or computer science student to research and implement SCORM Learning Object (LO) compliance by meta-tagging NPS learning objects utilized by our distance learning resource center. The prospective student could utilize free SCORM meta-tag tools available on the ADL website such as the Quick and Simple Meta-data Generator Version 1.0.1. The meta-data generator tool allows for the entry of course, content, and raw media meta-data information, which generates corresponding XML metadata

records. The researcher could also utilize free SCORM conformance test software to test LO's for SCORM version 1.2 compliance. This study will be beneficial to NPS efforts at SCORM compliance and may well be the beginning to a learning object digital repository for NPS.

2. Develop Web Portal for NPS Learning Objects

An opportunity exists for creating an NPS learning object database website that will house a collection of NPS SCORM-compliant learning objects. Similar websites exist for such academic organizations as Wisconsin Online Resource Center (Wisc-OnLine) and MIT's OpenCourseWare site. This endeavor would propel NPS to the forefront of SCORM compliance for military educational institutions.

NPS has the opportunity to be the first DoD educational institution with its own unique digital LO repository. The researcher will have to work closely with the Advanced Distributed Learning Content Clearinghouse Portal (ACCP) working group to ensure the learning objects will be fully compatible with the future DoD digital repository models. The intention of the NPS learning object database website is not to replace the ACCP but to expose the DLRC and the NPS distance-learning professors to the concepts and ideas behind SCORM-compliant learning objects and their utilization.

3. Updated Analysis of Implementation Issues

The research completed in this thesis took place in the infancy stages of the ADL initiative and SCORM architecture. An opportunity exists for a follow-up thesis on the new implementation issues as SCORM matures and begins to become a reality throughout the DoD.

4. Researching an ROI model for E-learning at NPS

An opportunity exists for the analysis of cost savings model for E-learning at NPS utilizing ROI models for E-learning, which takes into account the intangible factors of distance learning. A graduate student of the NPS business school would best accomplish this research.

D. SUMMARY

SCORM architecture will ultimately link every DoD LMS in a joint virtual learning environment. Initially, this would be an electronic amalgamation of DoD training sites and military colleges that will remain distinctive centers of education and training, initially retaining their autonomy but later becoming increasingly interdependent. The ADL initiative will create greater interoperability, compatibility, and synergy within the military education and training systems. For example, it will enable greater collaboration on joint doctrine and future war fighting concepts. SCORM architecture will allow sharing of speakers, lectures, courses, curricula, games, and simulations with all military and civilian colleges, as desired.

The possibility of sharing a field medicine courseware created by the Army with other Navy and Air Force training centers as well as civilian and NATO partners is a good example of this concept. Alternatively, the sharing of similar courses offered at civilian universities and NATO partner training facilities could potentially save large amounts of training dollars for DoD. E-Learning also offers the likelihood of greater integration with international institutions. This is vital to the future of DoD and NATO interoperability. SCORM architecture will also help the DoD education and training system to fuse more closely with military operations and ultimately help maintain the posture of the DoD as the most powerful military in the world.

There is a revolution in military education and training. This is the time to embrace those forthcoming changes. The JPME 2010 study and the training transformation plan both provide a solid basis for supporting the changes now underway.

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APPENDIX A. GLOSSARY

ADL Content Clearinghouse Portal (ACCP): A DoD prototype information system that conceptually enables DoD personnel to locate and reuse course content assets and objects from networked repositories as envisioned in the original ADL strategy.

Advanced Distributed Learning (ADL) Initiative: Sponsored by the Office of the Secretary of Defense (OSD), is a collaborative effort between government, industry and academia to establish a new distributed learning environment that permits the interoperability of learning tools and course content on a global scale.

Advanced Distributed Learning (ADL) Initiative/Co-Laboratories: Created by the Department of Defense the primary goal of the ADL laboratories is to develop the SCORM. The secondary goal is to bring together the different software companies, groups, interests, emerging-technologies and commercial and/or public implementations of SCORM.

Application Profile Interface (API): The communication routine that notifies the LMS of the state of the content.

ARIANDE: An Application Platform for the Web built entirely on Open Source technology.

Assets: Refer to the fundamental building blocks of learning content. Assets come in many electronic forms and files, which include text, data, sound, pictures, video, web pages, or any other pieces of data that delivered to a web client.

Aviation Industry CBT (Computer-Based Training) Committee (AICC): An international association of technology-based training professionals. The AICC develops guidelines for aviation industry in the development, delivery, and evaluation of CBT and related training technologies.

BlackBoard: Is designed for institutions dedicated to teaching and learning, and provides the functionality required to manage successfully distance, Web-enhanced, or hybrid education programs.

Broadband: Refers to telecommunication in which a wide band of frequencies is available to transmit information, allowing more information to be transmitted in a given amount of time (much as more lanes on a highway allow more cars to travel on it at the same time).

Chief of Naval Education and Training (CNET): Responsible to the Chief of Naval Operations for the education and training of Navy and Marine Corps personnel, both officers and enlisted. CNET oversees a network of training and education programs and activities that extend from coast to coast and to ships at sea.

Computer Based Instruction (CBI): The use of computers by teachers in managing instruction programs for students, such as creating and grading tests and monitoring student progress.

Content Aggregation Model: Defines the technical methods for providing a common means for creating learning content from searchable, reusable, sharable, and interoperable sources for the SCORM Model.

Content Aggregation: A map that aggregates the learning resources into units of instruction similar to a chapter or a module.

Courseware: Courseware, a term that combines the words course with software, is educational material intended as kits for teachers or trainers or as tutorials for students, usually packaged for use with a computer.

Data Model: Is the standard list of data elements used to define the information communicated between the LMS and the SCO.

Department of Defense (DoD): The Army, Air Force, Navy, and Marines. The nation's largest employer, with 1.4 million men and women on active duty military service, 654,000 civilians and another 1.2 million volunteers serving in the Guard and Reserve.

Deputy Under Secretary of Defense for Personnel and Readiness (DUSD (P&R)): The principal staff assistant and advisor to the Secretary and Deputy Secretary of Defense for Total Force management as it relates to readiness; National Guard and Reserve component affairs; health affairs; training; and personnel requirements and management, including equal opportunity, morale, welfare, recreation, dependents education, and quality of life matters.

Digital Knowledge Repositories: Digital repositories exist to support trainers to use and develop E-Learning to suit their own way of working. Digital repositories, in the broadest sense, are used to store any digital material. However, digital repositories for learning objects are considerably more complex both in terms of what needs to be stored and how it may be delivered.

Distance Learning Resource Center (DLRC): Oversees the technical and student issues associated with distance learning.

Education and Training Steering Committee (ETSC): Advises and assists the DUSD (P&R) on all phases of the ADL initiative.

E-Learning: E-Learning can be described as 'supporting a learning experience by either developing or applying Information & Communication Technology

eXtensible Markup Language (XML): Is a markup language for documents containing structured information.

GuardNet: The telecommunications infrastructure designed to deliver voice/video/data services to National Guard locations on a nationwide basis through seven regional hubs connected via a high-speed nationwide backbone.

IMS Global Learning Consortium, Inc. (IMS): Develops and promotes open specifications for facilitating online distributed learning activities such as locating and using educational content, tracking learner progress, reporting learner performance, and exchanging student records between administrative systems.

Information Model: Describes the data elements allowed to build SCORM-conformant metadata records.

Institute for Defense Analysis (IDA): A federally funded research and development center established to assist the Office of the Secretary of Defense, the Joint Staff, the Unified Commands, and Defense Agencies in addressing important national security issues, particularly those requiring scientific and technical expertise. IDA also conducts related research for other government agencies on national problems for which the Institute's skills and experience are especially suited.

Institute of Electrical and Electronics Engineers, Inc. (IEEE): A non-profit, technical professional association of more than 377,000 individual members in 150 countries. Through its members, the IEEE is a leading authority in technical areas ranging from computer engineering, biomedical technology, and telecommunications, to electric power, aerospace and consumer electronics, among others.

Launch: Starts the learning content by utilizing a routine method that defines a universal approach for LMS's to start SCO's.

Learning Activities Concepts: The first concept is a learning activity, best described as an embedded instructional event or events in a content resource.

Learning Management System (LMS): A software application or Web-based technology used to plan, implement, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance

Learning Object: Digital media that is designed and/or used for instructional purposes.

Local Area Network (LAN): A group of computers and associated devices that share a common communications line or wireless link and typically share the resources of a single processor or server within a small geographic area.

Metadata: Data about data.

National Economic Council (NEC): By Executive Order, the NEC has four principal functions: to coordinate policy-making for domestic and international economic issues, to coordinate economic policy advice for the President, to ensure that policy decisions and programs are consistent with the President's economic goals, and to monitor implementation of the President's economic policy agenda.

National Economic Council (NEC): Created in 1993 for advising the President on matters related to U.S. and global economic policy.

Naval Education and Training Command (NETC): Oversees all of naval education and training; and the disestablishment of Chief of Naval Education and Training (CNET).

Naval Personnel Development Command (NPDC): Supports and ensures standardization of training technologies and methodologies to the 13 learning centers, while working closely with the Fleet Forces Command.

Nonsecure Internet Protocol Router Network (NIPRNET): The DoD's nonsecure internet network for non-classified materials.

Office of Science and Technical Policy (OSTP): Advise the President and others within the Executive Office of the President on the impacts of science and technology on domestic and international affairs.

Plugfest: Bring together early adopters of the Sharable Content Object Reference Model (SCORM). Plugfest events provide ADL partners with the opportunity to synchronize the evolution and convergence of commercial authoring tools, learning management systems and Web-based courses with the evolving open-architecture specification.

PYTHON: The Naval Postgraduate School's official education management system.

Return On Investment (ROI): The increase in financial value provided by a new investment.

Runtime Environment: Provides a means for interoperability between SCORM-based learning content and learning management systems.

Secret Internet Protocol Router Network (SIPRNET): The DoD's secure internet network for classified to top secret materials.

Sequence Definition Model: Defines a set of elements used by content developers, which will define certain sequencing behaviors.

Sharable Content Asset (SCA): The second building block of the SCORM model is a collection of one or more assets packaged together.

Sharable Content Object (SCO): The third building block of the SCORM model is the Sharable Content Object, which essentially is an SCA that includes a single launchable resource and begins to utilize the SCORM runtime environment.

Sharable Content Object Reference Model (SCORM): SCORM is a compilation of specifications adapted from many sources that will ultimately enable the interoperability, accessibility and most importantly the reusability of courseware via Web-based learning management systems.

Task Force EXCEL: "Excellence through Commitment to Education and Learning." responsible for overseeing the implementation of the pilot programs designed to improve and support the Navy's training and education structure.

ThinkQ: Learning Management System utilized by the Navy E-Learning website.

Total Force Advanced Distributed Learning Action Team (TFADLAT): Advises and assists the Secretary of Defense, Joint Staff, Services and Defense Agencies on all aspects of distributed learning with the goal of ensuring that Department of Defense (DoD) personnel have access to cost-effective, high quality education and training, tailored to needs, whenever and wherever required.

Training Support Centers (TSC): Supports the Learning Centers in the daily execution of training requirements.

Training Transformation Implementation Plan (TTIP): Policy and guidance to the services that address the use of Advanced Distance learning. Also known as the T2 plan.

World Wide Web (WWW): A global, virtual-network based hypertext information system that uses the internet as its transport mechanism to display computer screens (or Web pages) of graphical, video, textual, and even audio information.

XML Data Binding: An integral part of the SCORM model that defines how to encode or bind the dictionary elements in XML.

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APPENDIX B. PRESIDENTIAL EXECUTIVE MEMORANDUM, JANUARY 30, 1998, SUBJECT: ENHANCING LEARNING AND EDUCATION THROUGH TECHNOLOGY.

THE WHITE HOUSE

January 30, 1998

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

SUBJECT: Enhancing Learning and Education Through Technology

The Federal Government continually invests in training its employees. Federal agencies have an obligation to provide the best training for their employees at the lowest possible cost. Federal agency training programs should be model users of new technologies to enhance learning. Many agencies are already improving training by using new technology effectively, but more can be done. New instructional technologies can also make education, at work and at home, easier and more convenient for all American workers. Federal programs that provide financial support for lifelong learning should adapt to the new opportunities technology provides. A Federal Government-wide effort is needed to explore how Federal programs and initiatives can better support the use of technologies for lifelong learning. Therefore, I hereby direct as follows:

1.   The National Economic Council (NEC), in consultation with the Chief Information Officers Council (CIOC) as established by Executive Order 13011 of July 16, 1996, the Office of Personnel Management (OPM) and the Office of Science and Technology Policy (OSTP), shall investigate how to make full use of emerging technologies to improve the cost effectiveness and the quality of Federal training programs. Specifically, I direct that within 6 months from the date of this memorandum the NEC, in consultation with CIOC, OPM and OSTP, provide me a plan identifying areas in which technology-enhanced training and learning may complement conventional Federal training and learning. The plan should describe how the agencies, when feasible and appropriate, will:

   (a) make full use of best commercial practices when purchasing instructional software;

   (b) work with businesses, universities, and other appropriate entities to foster a competitive market for electronic instruction;

   (c) develop a model technical approach to facilitate electronic instruction building on existing agency efforts, such as the Advanced Distributed Learning Initiative Partnership; and

(d) develop and support a program of research that will accelerate the development and adoption of new instructional technologies.

2. The Secretary of Education and the Secretary of Labor shall work together to promote adoption of the best new ways of using technology to enhance training and education in programs that provide Federal support for education and training.

3. The NEC, in coordination with the Office of Management and Budget, the OSTP, and other appropriate Federal Government entities, shall develop a national strategy to promote high quality education and training opportunities that can be offered in a manner that is efficient, affordable, and convenient. Industry, universities, labor unions, and other stakeholders should be consulted in the development of the strategy. The strategy shall be completed within 6 months of the date of this memorandum.

WILLIAM J. CLINTON

APPENDIX C. DEPUTY SECRETARY OF DEFENSE MEMORANDUM FOR DOD COMPONENTS, NOVEMBER 23, 1998, SUBJECT: DEVELOPING AND IMPLEMENTING THE DOD ADVANCED DISTRIBUTED LEARNING (ADL) INITIATIVE.

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
  CHAIRMAN OF THE JOINT CHIEFS OF STAFF
  UNDER SECRETARIES OF DEFENSE
  DIRECTOR DEFENSE RESEARCH AND ENGINEERING
  ASSISTANT SECRETARIES OF DEFENSE
  GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
  INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
  DIRECTOR OF OPERATIONAL TEST AND EVALUATION
  ASSISTANTS TO THE SECRETARY OF DEFENSE
  DIRECTOR OF ADMINISTRATION AND MANAGEMENT
  DIRECTORS OF DEFENSE AGENCIES
  DIRECTORS OF THE DEPARTMENT OF DEFENSE FIELD ACTIVITIES

SUBJECT: Developing and Implementing the DoD Advanced Distributed Learning (ADL) Initiative

  The extraordinary demands that today's dynamic international security environment places on the Department of Defense underscore the urgent need to identify more efficient and effective ways to educate, train, and support DoD personnel. In responding to those demands the Military Departments, Defense Agencies, Joint Staff, and Office of the Secretary of Defense have undertaken impressive actions to develop and apply advanced distributed learning technologies. As a measure of our success, the President has cited DoD's Advanced Distributed Learning (ADL) Initiative as a model for others to follow, and the Congress wants to expand these efforts.

  To ensure that we develop and implement such technologies as broadly and cost effectively as possible, I am directing the Under Secretary of Defense for Personnel and Readiness (USD (P&R)) to lead the Department's Advanced Distributed Learning (ADL) Initiative. The USD (P&R) will:

- Work with the Services, Joint Staff, and other DoD Components to produce an ADL policy for developing and implementing advanced distributed learning technologies across the Department;
- Develop, in coordination with the Services, Joint Staff, and DoD Components, an ADL "master plan" that addresses the plans, programs, and procedures necessary to carry out the policy;

- Coordinate with the Services, USD(A&T), and the Comptroller to ensure that sufficient programs and resources are made available to implement the ADL master plan; and
- Provide the DoD ADL strategic report to the Congress and the ADL master plan to me not later than February 23, 1999 and April 9, 1999 respectively.

At a minimum, the ADL master plan will provide a strategy for: using existing and emerging network-based technologies; creating and maintaining reusable learning content; promoting and establishing widespread collaboration within the Department of Defense, as well as with other federal agencies and the private sector; enhancing on-the-job performance through the systematic application of learning technologies; and developing a common technical framework for the distributed learning environment.

I have asked Tom Longstreth, Deputy Under Secretary of Defense for Readiness, to coordinate policy oversight of these efforts. I direct the Military Departments and all concerned to give Tom their full cooperation and provide to him the information that he requests so that I can submit a comprehensive report to the Congress and approve a well-thought-out and feasible master plan.

/S/
John J. Hamre

APPENDIX D. PRESIDENTIAL EXECUTIVE ORDER 13111, JANUARY 12, 1999, SUBJECT: USING TECHNOLOGY TO IMPROVE TRAINING OPPORTUNITIES FOR FEDERAL GOVERNMENT EMPLOYEES

THE WHITE HOUSE

Office of the Press Secretary
For Immediate Release   January 12, 1999
EXECUTIVE ORDER
USING TECHNOLOGY TO IMPROVE TRAINING OPPORTUNITIES
FOR FEDERAL GOVERNMENT EMPLOYEES

Advances in technology and increased skills needs are changing the workplace at an ever increasing rate. These advances can make Federal employees more productive and provide improved service to our customers, the American taxpayers. We need to ensure that we continue to train Federal employees to take full advantage of these technological advances and to acquire the skills and learning needed to succeed in a changing workplace. A coordinated Federal effort is needed to provide flexible training opportunities to employees and to explore how Federal training programs, initiatives, and policies can better support lifelong learning through the use of learning technology.

To help us meet these goals, I am creating a task force on Federal training technology, directing Federal agencies to take certain steps to enhance employees' training opportunities through the use of training technology, and an advisory committee on the use of training technology, which also will explore options for financing the training and post-secondary education needed to upgrade skills and gain new knowledge.

Therefore, by the authority vested in me as President by the Constitution and the laws of the United States of America, including the Federal Advisory Committee Act, as amended (5 U.S.C. App.), and in furtherance of the purposes of Chapter 41 of title 5, United States Code, the Government Employees Training Act of 1958 (Public Law 85-507), as amended, and Executive Order 11348, "Providing for the Further Training of Government Employees," and in order to make effective use of technology to improve training opportunities for Federal Government employees, it is ordered as follows:

Section 1. Establishment of the President's Task Force on Federal Training Technology.

(a) The "President's Task Force on Federal Training Technology" (Task Force) is established. The Task Force shall provide leadership regarding the effective use of technology in training and education; make training opportunities an integral part of continuing employment in the Federal Government; and facilitate the ongoing coordination of Federal activities concerning the use of technology in training. The Task Force shall consist of the heads of the following departments and agencies or their

representatives: the Departments of State, the Treasury, Defense, Justice, Interior, Agriculture, Commerce, Labor, Health and Human Services, Housing and Urban Development, Transportation, Energy, and Education; the Office of Personnel Management, General Services Administration, Environmental Protection Agency, National Aeronautics and Space and Administration, Small Business Administration, and Social Security Administration; a representative from the Small Agency Council; and representatives from other relevant agencies and related Federal councils, as determined by the Chair and Vice Chair of the Task Force.

(b) Within 30 days of the date of this order, the head of each agency or council shall designate a shall report directly senior official to serve as a representative to the Task Force. The representative to the agency head or the President's Management Council member on the agency's or council's activities under this order.

(c) The Director of the Office of Personnel Management (OPM) shall be the Chair and the representative from the Department of Labor shall be the Vice Chair of the Task Force.

(d) The Chair and Vice Chair shall appoint an Executive Director.

(e) The Task Force member agencies shall provide any required staffing and funding, as appropriate.

Sec. 2. Duties of the Task Force.

(a) Within 18 months of the date of this order, the Task Force shall develop and recommend to the President, through the Assistant to the President for Economic Policy and the Assistant to the President for Science and Technology, a policy to make effective use of technology to improve training opportunities for Federal Government employees. The policy should promote and integrate the effective use of training technologies to create affordable and convenient training opportunities to improve Federal employee performance. The Task Force shall seek the views of experts from industry, academia, and State and local governments as the Task Force proceeds, as appropriate. Specifically, the Task Force shall:

   (1) develop strategies to improve the efficiency and availability of training opportunities for Federal Government employees;

   (2) form partnerships among key Federal agencies, State and local governments, businesses, universities, and other appropriate entities to promote the development and use of high-quality training opportunities;

   (3) analyze the use of technology in existing training programs and policies of the Task Force member agencies to determine what changes, modifications, and innovations may be necessary to advance training opportunities;

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(4) in consultation with the Department of Defense and the National Institute of Standards and Technology, recommend standards for training software and associated services purchased by Federal agencies and contractors. These standards should be consistent with voluntary industry consensus-based commercial standards. Agencies, where appropriate, should use these standards in procurements to promote reusable training component software and thereby reduce duplication in the development of courseware;

(5) evaluate and, where appropriate, coordinate and collaborate on, research and demonstration activities of Task Force member agencies related to Federal training technology;

(6) identify and support cross-agency training areas that would particularly benefit from new instructional technologies and facilitate multi-agency procurement and use of training materials, where appropriate;

(7) in consultation with the General Services Administration, the Office of Personnel Management, and the Office of Federal Procurement Policy of the Office of Management and Budget (OFPP), promote existing and new procurement vehicles that allow agencies to provide innovative training opportunities for Federal employees;

(8) recommend changes that may be needed to existing procurement laws to further the objectives of this order and forward the recommendations to the Administrator of OFPP; and

(b) develop options and recommendations for establishing a Federal Individual Training Account for each Federal worker for training relevant to his or her Federal employment. To the extent permitted by law, such accounts may be established with the funds allocated to the agency for employee training. Approval for training would be within the discretion of the individual employee's manager. Options and recommendations shall be reported no later than 6 months from the date of this order.

Sec. 3. Duties of All Federal Agencies.

(a) Each Federal agency shall, to the extent permitted by law:

(1) include as part of its annual budget process a set of goals to provide the highest quality and most efficient training opportunities possible to its employees, and a set of performance measures of the quality and availability of training opportunities possible to its employees. Such measures should be, where appropriate, based on outcomes related to performance rather than time allocation;

(2) identify the resources necessary to achieve the aforementioned goals and performance measures articulated in its annual performance plan;

(3) and, where practicable, use the standards recommended by the Task Force and published by the Office of Personnel Management for purchasing training software and associated services; and

(4) subject to the availability of appropriations, post training courses, information, and other learning opportunities on the Department of Labor's America's Learning Exchange (ALX), or other appropriate information dissemination vehicles as determined by the Task Force, to make information about Federal training courses, information, and other learning opportunities widely available to Federal employees.

(b) Each Federal agency, to the extent permitted by law, is encouraged to consider how savings achieved through the efficient use of training technology can be reinvested in improved training for their employees.

Sec. 4. Duties of Specific Federal Agencies.

(a) In light of the Office of Personnel Management's responsibility for developing Government-wide training policy, coordinating and managing training policy programs, and providing technical assistance to Federal agencies, the Office of Personnel Management or other appropriate agency as determined by the Task Force shall:

(1) in consultation with the Task Force, the Department of Defense, the National Institute of Standards and Technology, the Department of Labor, and other appropriate agencies as determined by OPM, publish the standards for training software and associated services recommended by the Task Force; and

(2) ensure that qualification standards for civil service positions, where appropriate, reflect standard industry certification practices.

(b) The Department of Labor or other appropriate agency as determined by the Task Force shall, subject to the availability of appropriations:

(1) establish a specialized database for Federal training within the framework of the Department of Labor's ALX, or other appropriate information dissemination vehicles determined by the Task Force, to make information about Federal training courses, information, and other learning opportunities widely available to Federal employees;

(2) establish and maintain a training technology Website for agencies to post training needs and to foster communication among the agencies and between public and private sector organizations to identify and meet common needs; and

(3) establish a staffed help desk and technology resource center to support Federal agencies using training technology and to facilitate the development of online training courses.

(c) The Department of Defense or other appropriate agency as determined by the Task Force shall:

(1) in consultation with the National Institute of Standards and Technology, lead Federal participation in business and university organizations charged with developing consensus standards for training software and associated services and lead the Federal review of the standards; and

(2) provide guidance to Defense agencies and advise the civilian agencies, as appropriate, on how best to use these standards for large-scale development and implementation of efficient and effective distributed learning technologies.

(d) Each Executive department shall designate at least one subject area of training that it will use to demonstrate opportunities in technology-based training and assign an agency leader in the designated area. Leaders in these training technology experiments shall work closely with other agencies with similar training interests. Each Executive department shall develop a plan for measuring and evaluating the effectiveness, cost-effectiveness, and benefits to employees and the agency for each designated subject area.

Sec. 5. Establishment of Advisory Committee on Expanding Training Opportunities.

The Advisory Committee on Expanding Training Opportunities (Committee) is established. The Committee shall consist of not more that 20 members appointed by the President from outside the Federal Government, including representatives of the research, education, labor, and training communities, information technology sector, and representatives from other critical sectors. The President shall designate Co-Chairs from among the members of the Committee.

Sec. 6. Functions of the Advisory Committee.

The Committee shall provide the President, through the Assistant to the President for Economic Policy and the Assistant to the President for Science and Technology (Assistants to the President), with:

(a) an independent assessment of:

(1) progress made by the Federal Government in its use and integration of technology in training programs, particularly in the use of voluntary industry consensus-based commercial standards for training software and associated services;

(2) how Federal Government programs, initiatives, and policies can encourage or accelerate training technology to provide more accessible, more timely, and more cost-effective training opportunities for all Americans;

(3) mechanisms for the Federal Government to encourage private sector investment in the development of high-quality instructional software and wider deployment and utilization of technology-mediated instruction so that all Americans may take advantage of the opportunities provided by learning technology; and

(4) the appropriate Federal Government role in research and development for learning technologies and their applications in order to develop high-quality training and education opportunities for all Americans;

(b) an analysis of options for helping adult Americans finance the training and post-secondary education needed to upgrade skills and gain new knowledge. Options for financial mechanisms may include grants, tax incentives, low-interest loans, or other vehicles to make training and postsecondary education accessible to adults throughout their lifetimes; and

(c) advice on other issues regarding emerging technologies in government training and financing training and post-secondary education for adult Americans as specified by the Assistants to the President.

Sec. 7. Administration of the Advisory Committee.

(a) To the extent permitted by law and subject to the availability of appropriations, the Office of Personnel Management shall provide the financial and administrative support for the Committee.

(b) The heads of Executive agencies shall, to the extent permitted by law, provide to the Committee such information as it may require for the purpose of carrying out its functions.

(c) The Committee Co-Chairs may, from time to time, invite experts to submit information to the Committee and may form subcommittees or working groups within the Committee to review specific issues.

(d) Members of the Committee shall serve without compensation but shall be allowed travel expenses, including per diem instead of subsistence, as authorized by law for persons serving intermittently in the Government service (5 U.S.C. 5701-5707).

(e) Notwithstanding any other Executive order, the functions of the President under the Federal Advisory Committee Act, as amended, that are applicable to the Committee, except that of reporting to the Congress, shall be performed by the Office of Personnel

Management in accordance with guidelines that have been issued by the Administrator of General Services.

(f) The Committee shall terminate 2 years from the date of this order unless extended by the President prior to such date.

Sec. 8. Definitions.

(a) As used in this order, the terms "agency," "employee," "Government," and "training" have the meaning given to those terms, respectively, by section 4101 of title 5, United States Code.

(b) The term "technology," means any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information, including computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources. For purposes of the preceding sentence, equipment is used by an Executive agency if the equipment is used by the Executive agency directly or is used by a contractor under a contract with the Executive agency that requires the use of such equipment. The term "technology" does not include any equipment that is acquired by a Federal contractor incidental to a Federal contract.

Sec. 9. Judicial Review. This order does not create any enforceable rights against the United States, its agencies, its officers, or any person.

WILLIAM J. CLINTON
THE WHITE HOUSE
January 12, 1999

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APPENDIX E. CONGRESSIONAL STRATEGIC PLAN REQUIREMENT LANGUAGE TAKEN FROM THE STROM THURMOND NATIONAL DEFENSE AUTHORIZATION ACT FOR FY 1999.

SEC. 378. STRATEGIC PLAN FOR EXPANSION OF DISTANCE LEARNING INITIATIVES.

(a) Plan Required--The Secretary of Defense shall develop a strategic plan for guiding and expanding distance learning initiatives within the Department of Defense. The plan shall provide for an expansion of such initiatives over five consecutive fiscal years beginning with fiscal year 2000.

(b) Content of Plan--The strategic plan shall contain, at a minimum, the following:

(1) A statement of measurable goals and objectives and outcome-related performance indicators (consistent with section 1115 of title 31, United States Code, relating to agency performance plans) for the development and execution of distance learning initiatives throughout the Department of Defense.
(2) A detailed description of how distance learning initiatives are to be developed and managed within the Department of Defense.
(3) An assessment of the estimated costs and the benefits associated with developing and maintaining an appropriate infrastructure for distance learning.
(4) A statement of planned expenditures for the investments necessary to build and maintain that infrastructure.
(5) A description of the mechanisms that are to be used to supervise the development and coordination of the distance learning initiatives of the Department of Defense.

(c) Relationship to Existing Initiative--In developing the strategic plan, the Secretary may take into account the ongoing collaborative effort among the Department of Defense, other Federal agencies, and private industry that is known as the Advanced Distribution Learning initiative. However, the Secretary shall ensure that the strategic plan is specifically focused on the training and education goals and objectives of the Department of Defense.

(d) Submission to Congress--The Secretary of Defense shall submit the strategic plan to Congress not later than March 1, 1999.

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2. Dudley Knox Library
    Naval Postgraduate School
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